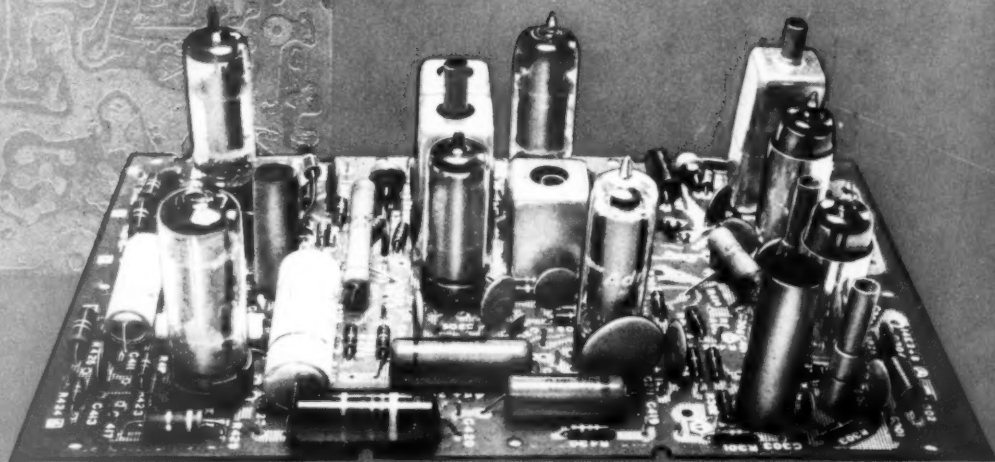
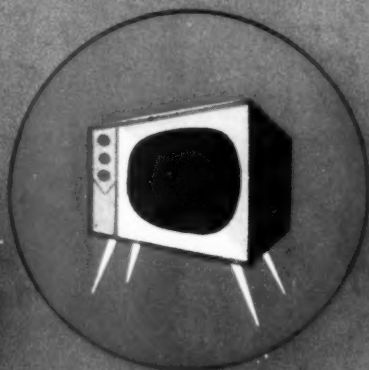
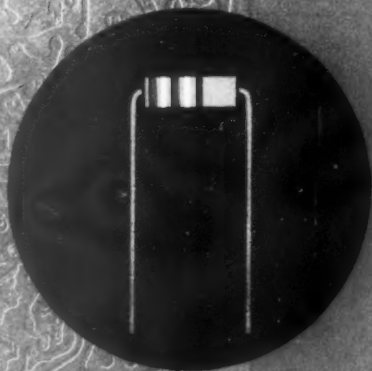


A HITCHCOCK PUBLICATION

assembly & fastener

ENGINEERING



SEPTEMBER • 1959

In this issue: **Reliable Printed Circuits for TV**
How Douglas Builds Commercial Jetliners
Bonding and Riveting Aluminum House Siding

Plan . . . perfection . . . production

This man is solving a fastener problem *the Pheoll way!*



The *versatility* of Pheoll-developed fasteners calls for an equal versatility in the plant. That's why the men in charge of our plant and production facilities must be as adaptable as Pheoll fasteners themselves. Ability to make tough decisions . . . to take in stride the sudden needs and urgent requirements that are a regular part of our business . . . are a measure of Pheoll's ingenuity. They must be able, too, to maintain their uniformly high quality level at all times. Knowledge born of years of application must be ever-present. Most important: the flexibility that comes with the willingness to *try* any method—and plan—that will solve a given fastener problem, get the right products to our customers *on time*. Why not turn *your* fastener problem over to our experts today? A phone call to your Pheoll field representative will set things in motion.

The MAN in the photograph is Stan Adamek, General Manager, a fastener specialist for 18 years.



Pheoll Manufacturing Co., Inc.

5700 WEST ROOSEVELT ROAD
CHICAGO 50, ILLINOIS

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assembly & fastener ENGINEERING

September, 1959

Volume 1, Number 12

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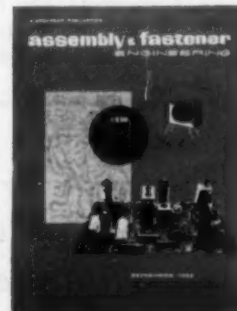
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• Printed circuit assemblies need not introduce tedious production problems. To see how Admiral turns out circuit board at the rate of 1000 a day, turn to story starting on page 34.

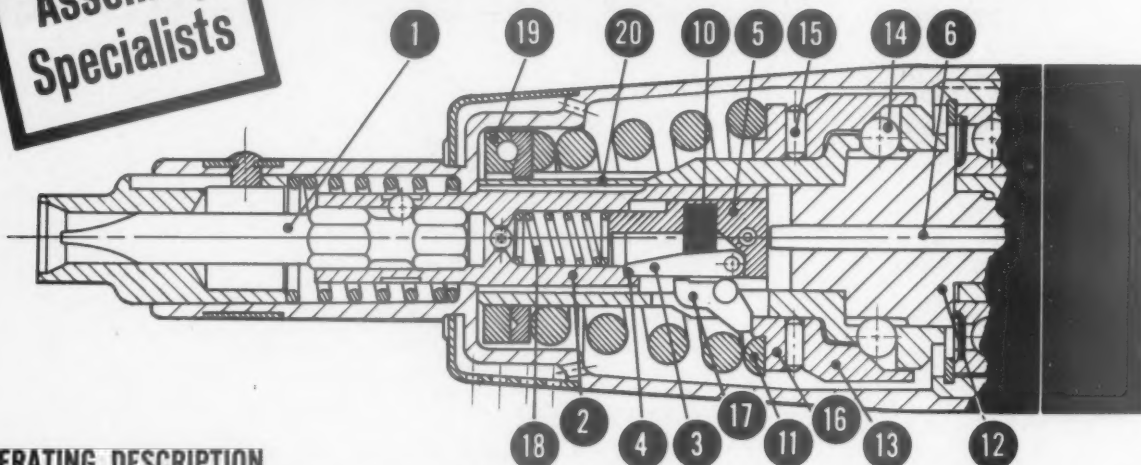


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ATTENTION!
Assembly
Specialists

Cleco's Automatic Torque Control Tools can Speed up your production---



OPERATING DESCRIPTION

OF THE CLECOMATIC* SCREWDRIVER-NUT RUNNER. An automatic start and stop tool.

Tool is started by pushing bit (1) against the work, movement of the bit moves spindle (2) into contact with latch (3) at shoulder (4). Latch is fastened to latch body assembly (5) which continues movement to throttle valve rod (6) and on to throttle valve (7) which, then opens at seat (8) admitting air to the tool, at which time compression in spring (9) is increased. Latch is held in engagement with shoulder by rubber spring (10). During run down cycle, bit is continuously held against work.

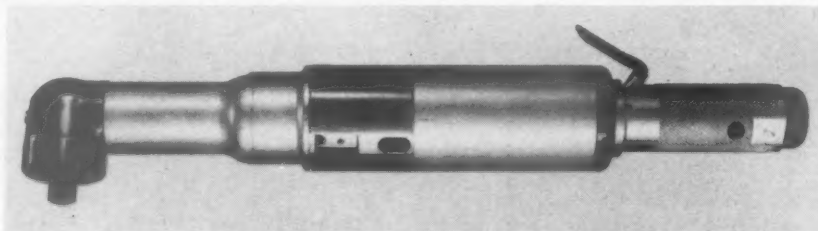
When required torque is reached at the driving spindle it is transmitted to pinion spindle (12) causing the hexagonal portion of pinion spindle to overcome the force exerted against it by the preset torque spring (11) acting thru ball retainer (13) and balls (14). The balls climb to the hexagonal crests forcing ball retainer away from the motor, and transmitting the motion thru thrust bearing (15) and thrust plate (16) pivoting latch dog (17) against, and disengaging, latch from shoulder, allowing latch body

No other nutsetter compares with Cleco's automatic 14 and 16 Series Right Angle Nutsetters for running down nuts and bolts to uniform tightness... quickly, because it is the only nutsetter employing the unique Clecomatic principle.

Torque is preset to precise specifications. When specified foot pounds are obtained, the air supply is shut off at the driving spindle. Torque adjustments are easily made externally—without disassembling the tool.

These dependable tools give you consistent quality control. Operator cannot over torque nut or bolt. When minimum air pressure is available to produce the desired torque, an increase in air pressure will not appreciably affect preset torque in the Clecomatic. Cleco Right Angle Nutsetters help improve your production efficiency, too! Hazardous, tiring tool kick is greatly reduced, and these rugged tools weigh less than competitive torque

*Trademark



This 16 ANS-500 model weighs only 7.5 lbs. and is 17¾ inches long. Angle head is 2¼ inches high. Both recessed socket heads and double-end spindles (reversible) are available. For individual operator comfort and efficiency, throttle lever can be revolved 360° to any desired position.

control wrenches. Your operators can produce more units per hour without extra effort... *end-of-shift slow down due to fatigue can be substantially decreased.*

Both the 14 and 16 Series are equipped with a non-friction clutch which permits long periods of maintenance free operation. All planetary gear trains have three equally spaced idlers. The same motor, handle, and clutch is used on different gear trains in each series. The tools are quickly and simply assembled and disassembled.

To see just how much these exclusive Cleco tools can do for your production operation, call your local Cleco sales engineer for a job tryout. There is no obligation.

CLECO AIR TOOLS

A Division of REED ROLLER BIT COMPANY
P. O. Box 2119 • Houston 1, Texas, U.S.A.
IN CANADA: Cleco Pneumatic Tool Company of Canada, Ltd.
927 Millwood Road, Leaside (Toronto), Ontario

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help you get better quality control!



Originated and solely produced by Cleco® Air Tools.

assembly, rod, and throttle valve to move forward, urged by compression in throttle to valve spring, thus automatically shutting off air supply to motor—even though operator may continue pushing against the work. At the time latch body assembly moves forward it compresses spring (18).

Pressure between bit and work is released permitting compression in latch body spring to move latch body assembly back to starting position and

thus permit latch to again engage with shoulder in spindle, completing the cycle.

To change torque setting, clutch assembly is simply removed from the tool and adjustment nut (19) screwed in or out on drive shaft (20) increasing or decreasing compression in torque spring thus raising or lowering the torque as desired. These tools are available in speeds ranging from 400 to 2900 r.p.m.

For screwdriving and nutsetting the completely automatic Clecomatic, originated and solely produced by Cleco, gives unprecedented speed, quality control, and economy.

This unique screwdriver — nut runner:

Starts and Stops Automatically. The operator merely engages the screw with the bit, the tool does the rest. There is minimum impact or vibration to tire the operator—production slow-down at the end of a shift is reduced.

Positively Holds Torque. Preset the torque to your most critical specifications, then forget it. An accurate, no-drift locking device positively maintains torque control. Increased air pressure will not appreciably affect torque setting. Non-friction clutch is easily removed and adjusted when torque change is desired.

Uses Less Air. Air motor operates only during actual rundown. Less air is required per job. Tool wear is greatly reduced.

Is Easy To Handle. The Clecomatic is shorter, weighs less. Automatic start and stop action eliminates bothersome triggers and levers.

Helps Reduce Parts Inventory. Gears, motors, and finders of the Clecomatic are interchangeable with Cleco No. 10 Series Drills and Screwdrivers. The Clecomatic is quickly converted from pistol grip to straight handle as required.

Model 10 RSA-10K Clecomatic Reversible Screwdriver has a speed of 700 rpm. Weighs 2 lbs. 8 ozs. and is only 10¾ inches long. Speed range of the #10 Clecomatic is 400 r.p.m. to 2900 r.p.m. The Clecomatic is available in reversible and non-reversible models, in either pistol grip or straight handles.



- Send free descriptive literature on: Clecomatic Screwdriver — Nut Runner..... ☐
- Right Angle Nutsetter..... ☐
- Have your representative contact us..... ☐

Name _____ Title _____

Company _____

Address _____

City _____ State _____

Another new fastener idea from Parker-Kalon

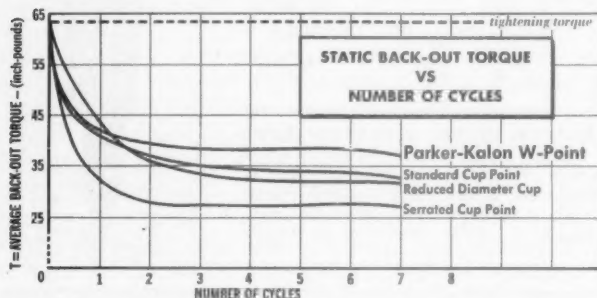
30% more back-out torque
50% more resistance to vibration
50% more resistance to rotary slippage

with the New **P-K® W-POINT** **SOCKET SET SCREW**

**NOW YOU CAN OBTAIN THE HIGHEST DEGREE
OF HOLDING POWER EVER ATTAINED**

30% MORE BACK-OUT TORQUE

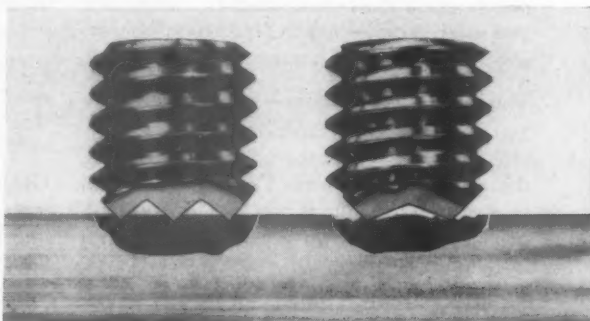
In a series of tests, performance of the new P-K *W-Point* was matched against that of small cup, serrated cup and standard A.S.A. cup point screws. A number of blocks and shafts were matched to precision tolerances for each of



the four set screws under observation. Again and again each screw was tightened on a new portion of the shaft, the screws loosened and the back-out torque recorded. Results were consistent and conclusive. In every test there was less decay in back-out torque for the new *W-Point* than for any of the other three types.

50% MORE RESISTANCE TO VIBRATION

In all tests under normal conditions of vibration, the other three types of set screws loosened and rapidly lost their holding power. Examination to determine the cause showed that with all other screws, final tightening caused them to deviate from the axial line through the center of the screw which in turn caused uneven tracking. The tests indicated that unless the cup point forms a true track in the shaft, vibration will result in loosening within a very short period of time. At the conclusion of each test run, the new P-K *W-Point* was still seated securely and in tight frictional contact with the shaft.



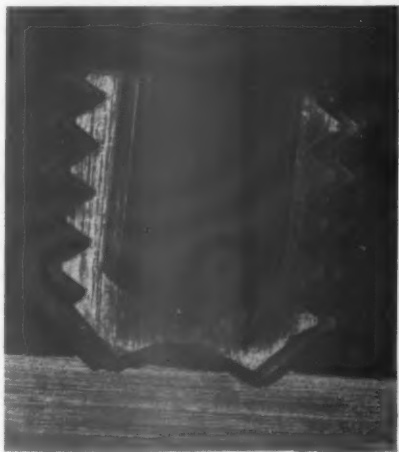
50% MORE RESISTANCE TO ROTARY SLIPPAGE

W-Point set screws, small cup, serrated cup and standard A.S.A. cup point screws were test-matched on various types and sizes of shafts at rest, in motion, and in start-and-stop operation. Examination of the impressions left on the work showed that all other types of cup point set screws when tightened, created tracks which are uneven in depth and shape. Impressions made by the new *W-Point* were perfectly circular and even in depth at all points on the circumference. There was also clear evidence of rotary slippage by the other cup point screws while the sharp pivot point of the *W-Point* Set Screw effectively prevented such slippage.

WOBBLE AND TIPPING CONTROL

Users of cup point set screws have long recognized two problems directly related to the proper seating of the screw on the work . . . "wobble" and "tipping". Until now, "wobble" could not be avoided because of the tolerance clearance which must be provided between screw threads and the tapped hole. In addition, users of conventional cup point set screws are aware of the fact that the key itself imparts a tipping movement to the screw during the tightening operation. The result of these two factors often results in a weakening of holding power. Upon completion of the torquing of a conventional cup point set screw, only a

part of the flank of the cup edge remains in frictional contact with the work. The guidance provided by the carefully engineered construction of the new P-K W-Point, reduces "wobble" and "tipping" to an absolute minimum—results in



true circular tracking by the cup edge with flanks in intimate frictional contact with the work. With "wobble" and "tipping" eliminated, the *increased contact areas PLUS the new pivot point PLUS* Parker-Kalon's uniformly finished Class 3A "ground thread" quality feature, provides the revolutionary W-Point with an inherent resistance to loosening . . . *a frictional grip superior to any type of cup point socket set screw now in use!*

TEST THE NEW W-POINT FOR YOURSELF

You are cordially invited to examine and test the new P-K W-Point socket set screw in your own plant. When you do, notice its precision manufacture, its perfectly finished ground threads, the well-defined last full thread. Like many important advances in technology, the W-Point



concept is simple and straightforward. In use, its superior performance and holding power will be demonstrated to your own satisfaction.

NO INCREASE IN COST

You get all the advantages of this revolutionary improvement in socket set screws *at no increase in price!* The W-Point is available in #4 to 1" diameters in Alloy, and #4 to 1/2" diameters in Stainless Steel . . . stocked in popular sizes. Other sizes made to order. Approved, Military Standards, 51017 through 51024.

FOR SAMPLES AND COMPLETE TECHNICAL DATA, CALL YOUR P-K INDUSTRIAL DISTRIBUTOR, OR WRITE DIRECT TO P-K FOR BULLETIN NO. 1106

Look to Parker-Kalon for quality Socket Set Screws, Cap Screws, Shoulder Screws, Button Head and Flat Head Socket Screws, Pipe Plugs and Dowel Pins . . . the most complete line in the industry. PARKER-KALON, a division of General American Transportation Corporation, Clifton, New Jersey. Offices and warehouses in Chicago and Los Angeles.

PARKER-KALON

W-Point* Socket Set Screws

*Patent Pending

CARL S. HARVEY, *Technical Director, Lamson & Sessions, tells why...*

You overspend when you overspecify... on fasteners

Overspecifying can be costly in ordering fasteners . . . especially in view of the trend toward higher "physicals" and correspondingly higher component costs.

Here's a typical example: A customer specified AISI 1137 steel (a screw machine grade) for a nut. After a look at the "physicals" we recommended a cold forged nut of AISI 1030 steel (a straight carbon steel) and met all requirements at considerably lower cost to the customer.

In many instances we're recommending ordinary grades of carbon steel over the customer's specs of low alloy content material. Our improved heat treatment practices make the savings possible. Elementary cases, perhaps, but they happen every day!

Take Advantage of the specialized experience and facilities available to you through L&S. Leave reference to "chemistry" open. Tell us what you want in end results. Give us the "physicals" and tolerances—then stop! This helps us save *you* money, in both purchasing costs and assembly costs.

*L & S Fastener Engineering
helps you "tighten up" on...*

- PURCHASING COSTS
- INSPECTION AND HANDLING COSTS
- ASSEMBLY COSTS



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THE EDITOR'S VIEW

SEPTEMBER, 1959, VOL. 1, NO. 12

HAVE YOU CONSIDERED A FASTENER SCHOOL?



When top management at Douglas Aircraft committed the company's resources to building the new DC-8 Jetliner (see page 26), the decision was made with the assurance that only employees schooled in the latest fastening techniques would assemble the aircraft. Moreover, only those workers passing rigid examinations would be permitted to do certain critical fastening operations.

What a tremendous uplift this assurance must also give Douglas engineers. They know that all their engineering effort will be followed up with quality workmanship.

Behind this confidence is the company's "fastener school" which is conducted under auspices of their Long Beach Division's Industrial Training Department. Organized in 1949, the school has 11 instructors who teach some 20 courses, all dealing with some vital phase of aircraft production.

Subjects range all the way from the correct interpretation of a blueprint to the production of

a mirror-finish hole for fastener installation.

The number of courses given the employee-students varies. Some are continuous, like the one on the riveting technique approved by the National Aeronautical and Space Administration. Other courses are sporadic, and are given only when production requires the training of additional personnel in specific types of work.

In the interest of quality control, the fastener courses are coordinated with Process Engineering during the development of lectures and other course information.

But we're getting too far into our west coast editor's report of this interesting school which will be featured next month in our first anniversary issue.

The thought here is merely to whet your appetite for more details on this on-the-job training school. Such a school can be used to great advantage by any company as concerned with quality control as Douglas Aircraft.

Orville E. Kneafsey

Managing Editor

ALLEN

The cost of ALLEN Hex-Socket Cap Screws is only a minor fraction of your assembly costs . . . be sure you're getting the timesaving, cost-saving advantages of genuine Allens!

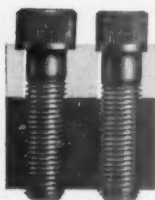
Ever since Allen first produced the hex socket head screw nearly fifty years ago, specifying *genuine* Allens (made by Allen of Hartford) has been a sure way to guarantee dependable threaded fastening.

Only *genuine* Allens have Leader Points that make starting easier, and greatly minimize danger of cross threading. *Genuine* Allens are "pressur-formd" to preserve the long fibers uncut throughout the length of the screw, giving stronger sockets for greater tightening torque.

Write for samples and engineering data. See how *genuine* Allens will make your product better.



Allen's new 1960 Series Socket Head Cap Screws give up to $2\frac{1}{2}$ times more load carrying capacity, without indentation.



Head diameter of sizes from $\frac{1}{4}$ " up is now uniformly $1\frac{1}{2}$ times the body diameter—providing more under-the-head bearing surface, and a proportionate increase in clamping force. Write for new Bulletin G-25, with full specifications.

Stocked and sold by leading Industrial Distributors everywhere



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Letters to the Editor

Self-Tapping Screws

I wish to obtain ten copies of the article in July entitled, "How Good Are the Self-Tapping Screws You Buy?", by Louis Lovisek. Would you please send reprints or let us know how to obtain them?

F. H. Worcester
Manager, Quality Control
General Electric Company
Morrison, Illinois

May we have tear sheets or a reprint of the article on "self-tapping screws?"

H. W. Kupetsky
Project Engineer
Westinghouse Electric Corp.
Baltimore, Maryland

Torque and Tightening

A member of our engineering department recently made reference to a series of articles in your magazine on torque and tightening of threaded fasteners. May we obtain reprints of these articles for use in our training program?

R. E. Gibson, Supervisor
Technical, Special
and Shop Training
Lockheed Aircraft Corporation
Burbank, California

Fasteners for Midget Cars

We thought your many associates might be interested in the fantastic growth being experienced in the midget car industry, and that there is one crying need for better fastening.

Currently, fiber-glass bodies or sections thereof are attached with an old-type fastener requiring a big screwdriver and lots of muscle. This is rather hard on the car body, and occasionally on nerves when one has to get "inside" in a hurry.

The optimum fastener would be one which would require no tools for opening, flush, attractive, simple in operation, and strong.

Norman S. Benedict
"Quarter Midget World"
Inglewood, California

Weld Fasteners

Your articles on "The Design and Application of Weld Fasteners" were very interesting . . . Would you please send me a copy of Parts I and II for reference use.

Lawrence Barnes
Manufacturing Development
Rochester Products Division
General Motors Corporation
Rochester, New York

ROSÁN

PRESS TERMINALS

install in seconds



PRESS • IT'S LOCKED,

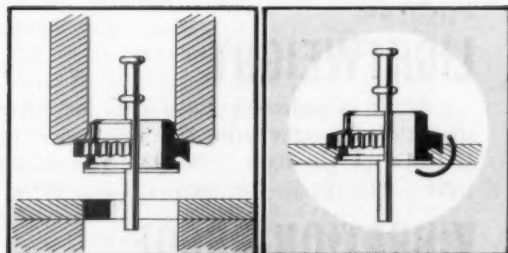
- ★ Against Pull-Out
- ★ Against Rotation

SAVE HOURS OF PRODUCTION TIME WITH HOPPER-FED ROSÁN PRESS TERMINALS

(Manual Installation Simple and Efficient)

- ELIMINATE cracked insulator glass due to soldering heat.
- ELIMINATE solder preparation, soldering and flux removal.
- ELIMINATE more than two step installations.
- ENJOY substantial production savings thru positive locking.

... Specify ROSÁN Precision Fasteners for all your Requirements.



Place PRESS TERMINAL into hole and apply force to knurled flange with installation tool.

Parent material flows into locking space. Serrations swedge into material to prevent rotation.

METHOD OF INSTALLATION

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Branch Offices: CHICAGO • DETROIT • NEWARK • FT. WORTH • SAN FRANCISCO • SEATTLE • DAYTON • MILWAUKEE • WASHINGTON, D.C.

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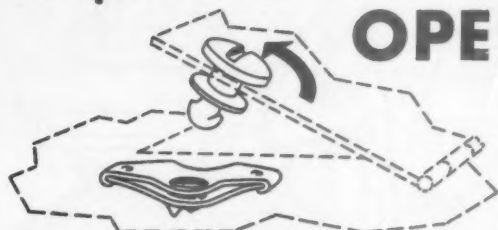
One-quarter turn . . .

CLOSED



One-quarter turn . . .

OPEN



LION QUARTER-TURN FASTENERS

QUICK TO INSTALL

Lion Fasteners can be installed rapidly. Studs simply slip through drilled hole and are retained by a grommet. Springs are riveted or spot-welded in place.

RUGGED

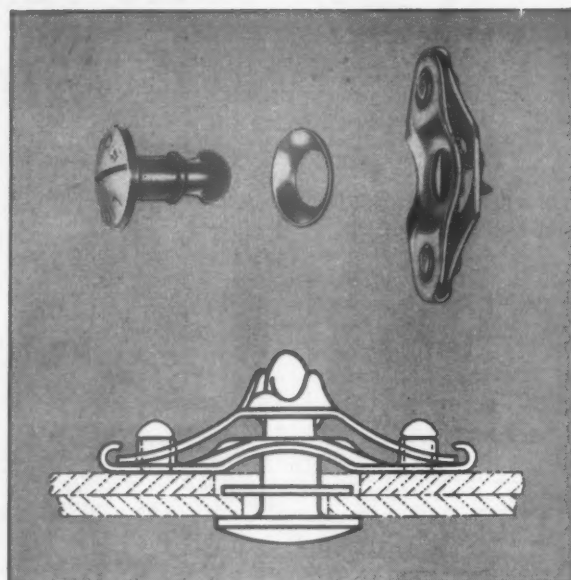
Lion Fasteners stand up under the most rugged conditions of shear, tension, and vibration . . . meet or exceed the exacting requirements of Army-Navy-Air Force Specifications MIL-F-5591A (ASG) and have Civil Aeronautics Administration approval for civilian aircraft use.

LIGHTWEIGHT

Made of cadmium-plated steel to provide a high strength-low weight ratio, No. 5 Fasteners weigh only 12 to 14 lbs. per 1000 . . . No. 2 Fasteners 3 3/4 lbs. per 1000 . . . No. H Fasteners approximately 35 lbs. per 1000.

VIBRATION-PROOF

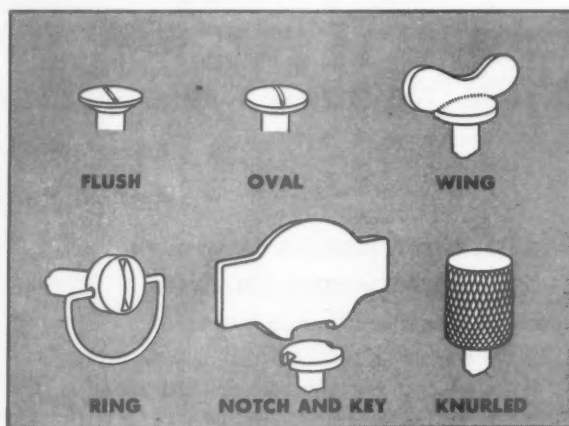
This group of fasteners is particularly suited to metal fastening conditions where vibration is an im-



portant factor. Lion Fasteners can't shake loose . . . can't open by themselves.

FULL RANGE OF HEADS...

The Lion No. 5 Fastener is available with flush, oval, ring, wing, knurled, or notched head and key; No. 2 Fastener is available with flush, oval, or wing type head; the No. H Fastener comes with an oval head.



LION Aviation FASTENERS

SOUTHCO FASTENERS
LION

SOUTH CHESTER CORPORATION • LESTER, PENNSYLVANIA

For complete information on Lion Quarter-Turn Fasteners, as well as on the complete Southco line, write today to Southco Division, South Chester Corporation, 257 Industrial Highway, Lester, Pa



BLIND
RIVETS

SCREW
FASTENERS

ADJ. PAWL
FASTENERS

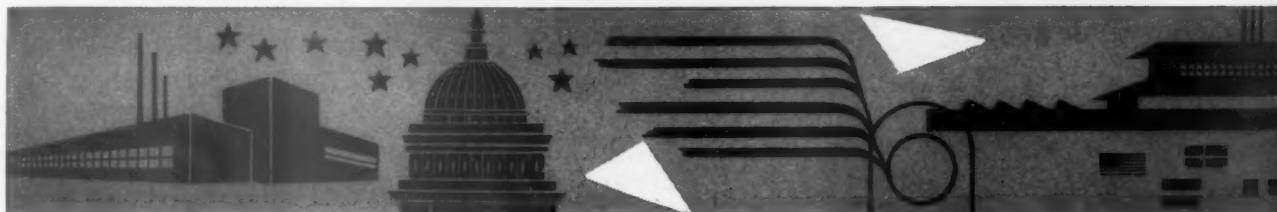
DOOR
LATCHES

RETAINING
SPRINGS

ANCHOR
NUTS

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The State of Business



BUSINESS SEES "RED" OVERSEAS!

Part 2

by **W. Jack Butler**
Arabian American Oil Company

If any overseas business is to make a positive impact on the community in which it operates, it must have managers of real ability.

Managers must have a broad knowledge of international affairs and act as business statesmen. Furthermore, they must know their jobs thoroughly. (One of the appealing pro-Communist arguments is "the Reds may be tough, but they get things done!") And the overseas manager should be a man who merits respect at home.

From the American businessman's viewpoint, one of the big frustrations of living and working abroad is local failure to take advantage of available opportunities.

Representatives of foundations and officials of U.S. technical assistance programs have been developing skills in nationals for years, but little of this know-how is being employed. Much of the oil company taxes, royalties and wages going into the Middle East could provide a more dynamic influence with competent and enterprising management.

Training programs represent the most costly long-term commitments that companies have to make in order to do business over the long pull. Aramco, the Iraq Petroleum Co., Parke, Davis & Co., American Metal Co., Ltd., and the National Cash Register Co. have had outstanding programs.

Even at the expense of some loss of efficiency and despite additional costs, maximum responsibility for

managing supporting services should be placed on nationals. Managers cannot spread independent business values while they continue to harbor large housing, medical, transportation services within their organizations. To nationals, these are gratuities handed down by a patronizing employer.

American management can help nationals establish the projects themselves, giving emphasis to local initiative.

It is better to contribute to outside institutions than to support company-run welfare programs.

Opportunities, however, should not be made to seem the God-given right to every man, but as something to be earned through effort and training. Charles Shaw, a former industrial relations executive of Standard Oil Company (New Jersey), discovered in a survey among ranking Iranian employees that the chief contributing cause for rebellious attitudes was the belief that the work of their British employers was not difficult. "They made it look too easy," the Iranians said.

Businessmen should direct their efforts to contain Communism at educated young men, particularly in the ranks of labor, educators and the military. It is just after the youth of underdeveloped countries have cut away from their cultural past and before they have attained a standard of living that is within the bounds of modern Western culture that they are easy marks for Communism.

In this endeavor we cannot support the anti-colonial, ultra-nationalist spirit. Neither can we try to thwart it—it is too vigorous and uncompromising.

The only sensible way out of this problem is to try to turn it to our advantage. This spirit must be redirected from political into economic channels, so that it may become a force for constructive progress just as it served to propel our own dynamic industrial expansion. Solution of social and political problems will come more quickly with prosperity. (Kamal Ataturk understood this fact when he rammed Turkey through an industrial renaissance in a few years.)

Nationals must have a true picture of how American business is operating in their countries. Communication cannot be conducted only at the level

continued

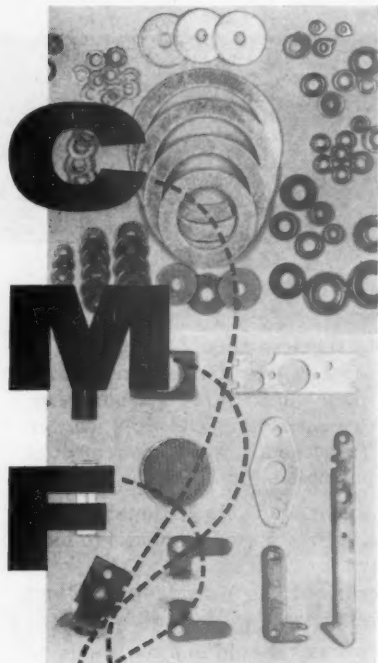


W. JACK BUTLER

Aramco Public Relations
Dhahran, Arabia

Harvard Business School graduate W. J. Butler has lived and worked in Saudi Arabia for eight years as public relations manager for Aramco. He served as a lieutenant commander in the U.S. Navy.

A BARWOOD SPECIALTY



CREATIVE MATERIALS FABRICATION

Stamped, punched and die cut parts, designed and produced to your specifications is a BARWOOD specialty. Working with all types of metals, fibrous materials, synthetics, Nylon, Teflon, phenolics, etc., our plant produces a wide range of parts for the most exacting requirements. BARWOOD has developed many innovations in fastening and sealing methods that have substantially reduced assembly costs in customer plants.

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 • PRECISION METAL STAMPINGS
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 • GASKETS • PACKINGS
 • DIE-CUT PARTS • SHIMS • SPACERS
 ... our automated production facilities integrated with your assembly schedules mean more profitable productivity for you.

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State of Business, continued

of government leaders; it must also be directed at the public.

When Khrushchev charges that the oil companies are "grabbing Iranian oil and make a profit out of the starvation and poverty of the Iranian people," the managers must throw the lie back in his teeth by having created a public mind that, because of the values it observes and its understanding of the companies' many contributions, nullifies Red propaganda.

To help accomplish this, businessmen will have to utilize the full power of public relations: institutional advertising, trade fairs, traveling lectures, school liaison programs, articles, films, radio, exhibits, tours of company facilities, books that expose the fallacies of Communism. Information must achieve emotional impact, since the Asian mind responds to it much more readily than to cold facts and figures.

General Sir John Glubb has stressed this need. "Britain is being driven from the Middle East by words," he says. After years of experience in the area, he urges Britain to "turn all her energies to these weapons . . . Tell the truth—good and strong and loud. Truth is fatal to dictators and racketeers. Give it to them straight from the shoulder."

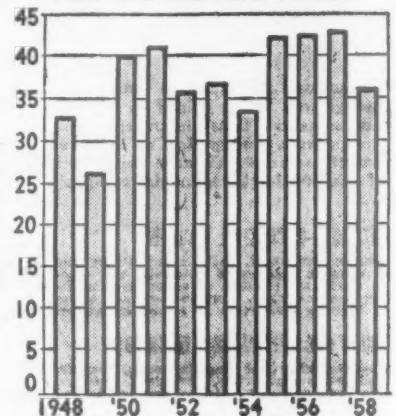
Leadership is another aspect. All causes that mean anything to the people of South Asia and Africa are built around the personal leadership of a Nasser, a Nehru, or a Khrushchev. To compete, every manager abroad must be a vigorous and informed spokesman for America and progress.

Here lies the most important task that the businessman—or any other American working with foreigners—must perform. It is the most difficult to describe, the most nebulous, yet it underlies the entire program. Unless we can get across what our values are and what they can mean for these people in their own lives and the solution of their problems, we are beaten before we start.

A more extensive treatment of this subject by the author was published by the Harvard Business Review.

Example is the best teacher. If the executive does his job well, if he lays a solid foundation for stability and well-being by providing opportunities, if he bears in mind his social and community responsibilities, if he mobilizes all the power forces available to him, he can get across a good part of his story.

PROFITS BEFORE TAXES



The Profit Front—

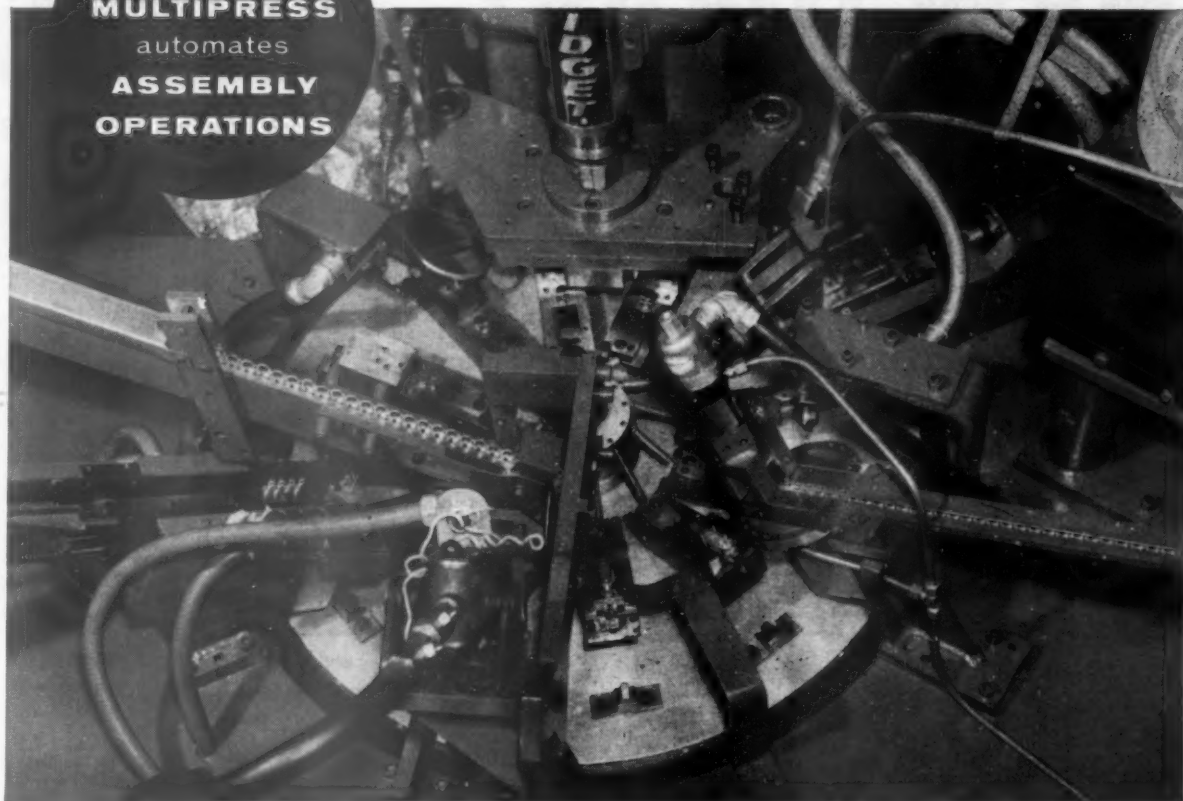
Booming 1959 corporate earnings (at a \$48 billion rate) caused optimists to talk in mid-July about that magic \$50 billion profit year. In any event, the record of \$44.9 billion set in 1955 should be exceeded, unless the steel strike drags into the Fall. To date, few customer tears have been shed over the USW walkout, thanks to adequate stockpiling and an anticipation for a glorious fourth quarter recovery. The top previous quarter, \$48.6 billion in 1955, should be bettered.

Steelmakers lead the parade in reporting all-time high earnings, though it's the much improved profit margin per-dollar-expended that is important. Autos, building materials, softgoods are also benefitting from increased public demand, while rising sales are blessing the chemical, glass, rubber, electrical equipment industries. Only oil and some aircraft companies are suffering.

The economy would be greatly affected by a \$50 billion year: 1) a balanced federal budget, 2) higher dividends, more enthusiasm for stocks, 3) capital spending, 4) increased wage demands from labor.

How
**DENISON
MULTIPRESS**
automates
**ASSEMBLY
OPERATIONS**

45 assemblies-per-minute are produced on this 1-ton Denison hydraulic Multipress and automatic index table at the Unique Balance Division, S. H. Pomeroy Company, Dubuque, Iowa.



MULTIPRESS assembles and inspects complex 4-part components

...at a rate of 2700-per-hour

With this Denison hydraulic Multipress and feeding devices, production assembly of complex units has been increased and costs reduced considerably.

Completely automatic, the particular operation shown assembles and inspects the four-part assemblies at a rate of 45-per-minute...2700-per-hour. Any defective assemblies are automatically rejected. The operator has only to supervise the equipment and load component hoppers.

The automatic operation shown is typical of how multi-component assembly operations can be simplified with Denison hydraulic Multipress and simple tooling. The Denison field man near you can help analyze your work and demonstrate how you can duplicate these savings in your plant. Write for the Denison catalog describing the full line of Multipress units for your work.

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check these cost-cutting NEW IDEAS from SETKO

then check the coupon below for full information and free test samples

IDEA #1 "NU-CUP® POINT GRIPS THINWALL TUBING BETTER THAN ALL OTHERS TESTED!"



42% sharper angle on point cuts deep into the metal in a circular manner!

CONVENTIONAL

An independent manufacturer tested all types of points to find the one that would hold best... and perform most dependably. He chose NU-CUP. Could you use this idea? Check No. 1. (Name of Mfr. on request.)

Set Screw & Mfg. Co.

IDEA #2 THIS COST-CUTTER TAKES 50% MORE TORQUE BECAUSE OF SLABBED HEAD CONSTRUCTION!

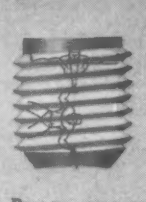


Costs less than comparable hexagon head set screws.

If you are having trouble with stripped heads or insufficient holding power, chances are the Setko Slabbed Head Set Screws are just the idea you need... Available in all points and metals. Check No. 2!

Set Screw & Mfg. Co.

IDEA #3 IS VIBRATION CAUSING LOOSE SET SCREWS ON YOUR PRODUCTS?... ELIMINATE THIS PROBLEM WITH ZIP-GRIP®!



Slight variation of thread causes locking action on mating surface!

Proven as an outstanding principle in many products, Zip-Grip has found particular acceptance wherever the stress of movement or vibration occur. Makes an outstanding adjusting screw... Can be reapplied many times... Got an idea? Check No. 3.

Set Screw & Mfg. Co.

IDEA #4 TINY SCREWS DO BIG HOLDING JOB... THEY'RE CALLED "MINI-MITE"



You'll find them perfectly-produced counterparts to their big brothers!

If miniaturization is one of the fields that you're interested in, then you'll see many good ideas in the perfectly-produced, money saving selection of Mini-Mites... Why pay for Specials when these can keep your costs at a minimum... Get the idea? Check No. 4.

Set Screw & Mfg. Co.

IDEA #5 NEW SELF-LOCKING SET SCREW SELECTOR CHART LISTS OVER 1,001 COMBINATIONS.



Helps you determine available combinations best for your particular application!

Here is another Setko first... A complete listing of locking actions, points, metals, drives, etc., including suggested applications of the complete line of Setko self-locking screws... It's jam packed with ideas for you! Check No. 5.

Set Screw & Mfg. Co.

IDEA #6 "SETKO HOPPER FEEDER SAVED US \$42,000 IN FIRST YEAR."



Here's the first truly Automated method of hopper feeding Headless Set Screws.

Unique Setko Hopper Feeder design orients headless Set Screws then feeds them to a driving device... Savings like the one shown above are but one of the advantages (name of mfr. on request)... Product quality is consistent, etc. This cost-cutting idea is one you can't miss! Check No. 6.

Set Screw & Mfg. Co.

IDEA #7 NOW YOU CAN GET COLD FORGED "PERFECT HOLE" CAP SCREWS IN THE NEW '60 SERIES... and in STAINLESS STEEL, TOO!



If you're a user of Cap Screws you'll want to examine these yourself... We know you'll get our idea of trying to produce a perfect product consistently... We're sure you'll appreciate their performance once you've tried them... Would you like test samples? We'll be glad to send them! Check No. 7 and indicate sizes, etc.

Set Screw & Mfg. Co.

IDEA #8 THERE'S A BARREL-FULL OF IDEAS IN THE NEW 28-PAGE SETKO CATALOG #23.



The complete line of cost-cutting SETKO Socket Screw Products is at your fingertips.

You'll want this compact catalog for your personal use... And you'll particularly like the easy to read manner in which it has been prepared. Want a copy? Check No. 8.

Set Screw & Mfg. Co.

Set Screw & Mfg. Co.

705 MAIN STREET, BARTLETT, ILLINOIS

Please send me Idea information on items checked below. (If FREE samples are wanted of any of these products, send your specifications.)

<input type="checkbox"/> 1. Nu-Cup	<input type="checkbox"/> 5. Self-Locking Selector Chart
<input type="checkbox"/> 2. Slabbed Head	<input type="checkbox"/> 6. Hopper Feeder
<input type="checkbox"/> 3. Zip-Grip	<input type="checkbox"/> 7. Cap Screw
<input type="checkbox"/> 4. Mini-Mite	<input type="checkbox"/> 8. Catalog

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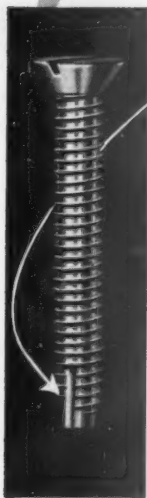
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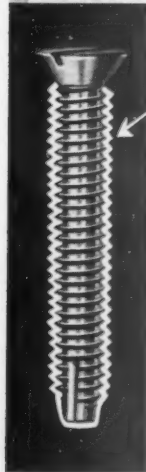
HOW

to know you're
getting the quality
you want



Look here

for sharp cutting edge and proper positioning of cutting slots in thread-cutting fasteners. Poor slots cost you money in replacing fasteners and damaged products . . . and the money comes out of profits. At American you get the combination of the best equipment and constant attention that gives you the quality you want.



Look here

for the well-defined threads you must have on thread-cutting fasteners. Without them, your fasteners don't follow the cut accurately, won't tighten . . . and it costs you money out of profits to replace them. At American, the best equipment and constant inspection maintain this mark of quality.

**Profit
Improvement
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Quality fasteners cost more to produce . . . improve your profits when used!

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Industry at Work, continued

of an earth satellite. V. C. Wilson, of the General Electric Research Laboratory, said that thermionic converters were first proposed in 1915, but that laboratory experiments, stimulated by the need for light-weight generators are just beginning to pay off. In their simplest form, thermionic converters consist of a vacuum tube in which one piece of wire is heated enough to make it give off electrons while another piece, colder, collects the electrons and feeds them to an outside circuit.

A paper written by Herman A. Liebhafsky and David L. Douglas also of General Electric, said that

fuel cells for special applications, using hydrogen as a fuel, should be ready within five years.

In a fuel cell, a fuel such as hydrogen, coal, or carbon monoxide reacts with oxygen from the air. Instead of heat, this reaction generates electricity directly. The process is something like the reverse of the high school chemistry experiment, in which electricity from two wires suspended in water causes the hydrogen and oxygen to separate. Instead of using electricity to get hydrogen and oxygen, the cell would use hydrogen and oxygen to get electricity.

ONE FUEL LOAD CAN POWER NUCLEAR SHIP 350,000 MILES

The primary source of power for the recently-launched N.S. SAVANNAH is a 26½' tall nuclear power reactor located amidships. The reactor designer estimates the merchant vessel could travel as much as 350,000 miles at 20 knots on one fuel loading.

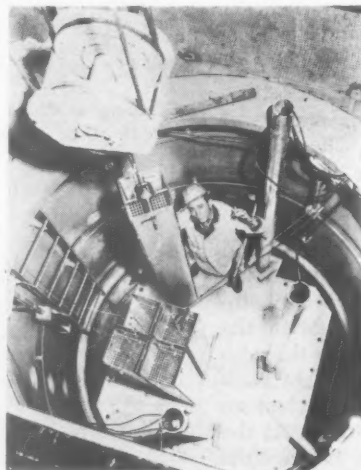
Within the 145-ton reactor are 32 fuel elements, each containing

Fuel elements fit into an "egg crate" type lattice which provides the equivalent of a pressure can around each element. To withstand the pressure differentials created during reactor operation, the latticework is constructed of stainless steel, ranging in thickness from .094 to .109" thick.

Modulation of the nuclear reaction is achieved by 21 control rods, each shaped somewhat like a cross. Control rods are .375" thick stainless steel of sandwich design: a 3/16" thick plate of boronated stainless between two 3/32" thick stainless steel plates.

The reactor vessel containing the fuel elements is approximately 27' tall by 11' in outside diameter, with an inside diameter of about 7½'. Vessel walls are 6½" thick. The entire interior surface of the vessel is clad with stainless steel, .109" thick. The metal container is designed to operate at 650°F. confining water coolant at 2000 psi.

The bottom head of the reactor vessel is forged from a 58,646-pound circular plate of carbon-silicon steel, 15' in diameter. Before forming, the plate surface which became the inside of the forged head was clad with type 308L low carbon stainless steel. The reactor head is believed to be the largest, thickest and heaviest pressure vessel closure ever forged in one operation by die-forming.



Reactor builder technician checks fuel element shells for fit in tank of reactor that will power the nuclear ship Savannah.

164 fuel rods of type 304 stainless steel. The interior of each stainless rod is filled with sintered uranium oxide pellets that act as fuel.

Each of the 164 fuel rods are composed of four bundles of 41 rods each. Rod spacing is maintained by small tubular stainless steel ferrules, brazed in place about every eight inches along the 76-inch long element.

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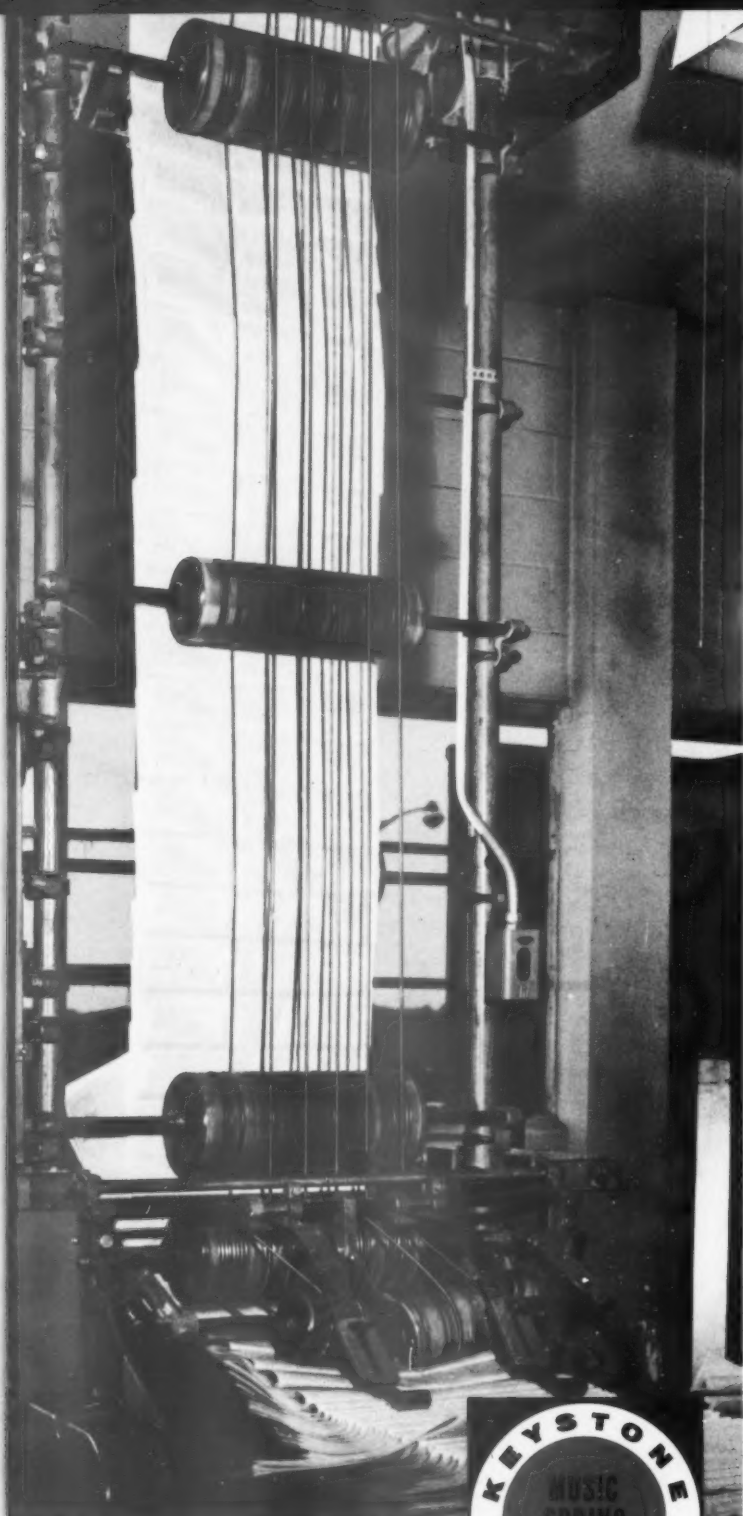
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This battery of Cutler-Hammer newspaper conveyors was recently installed at the modern plant of the Peoria Journal Star, Peoria, Ill.



CARRYING THE NEWS

on a



wire belt

Keystone Music Spring Wire used in Cutler-Hammer newspaper conveyors delivers newspapers from the presses on time, all the time.

Folded newspapers—varying from a few pages to extra thick editions ride directly from the high-speed press, between endless coiled wire belts made from specially processed Keystone Music Spring Wire. The papers are lifted straight up, carried overhead and conveyed to the delivery room. The flexibility in the design of the Cutler-Hammer conveyor with its coiled springs permits turns and bends as required by the installation.

Failure of a single spring could mean a deadline missed. It is for this reason that Cutler-Hammer uses Keystone Music Spring Wire—a wire that creates owner satisfaction.

Despite comparatively severe and small radius bends required to form the belts, Keystone Music Spring Wire runs smoothly and flawlessly through the forming machines at Cutler-Hammer.

Keystone Music Spring Wire is successfully used in many other applications requiring high quality, high strength and extreme fatigue resistance.

This same kind of production advantage and customer acceptance can be of value to you and your product. It only takes a telephone call to your Keystone representative to learn the details.

Keystone Steel & Wire Company, Peoria 7, Illinois

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WIRE FOR INDUSTRY

UNIVERSAL **-A**UTOMATIC CORPORATION



SINGLE SPINDLE

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RIVET DRILLING & TAPPING

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CAPACITY-3/8" STEEL

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Assembly and Fastening Ideas

QUICK-CURING BOND SPEEDS PEN ASSEMBLY

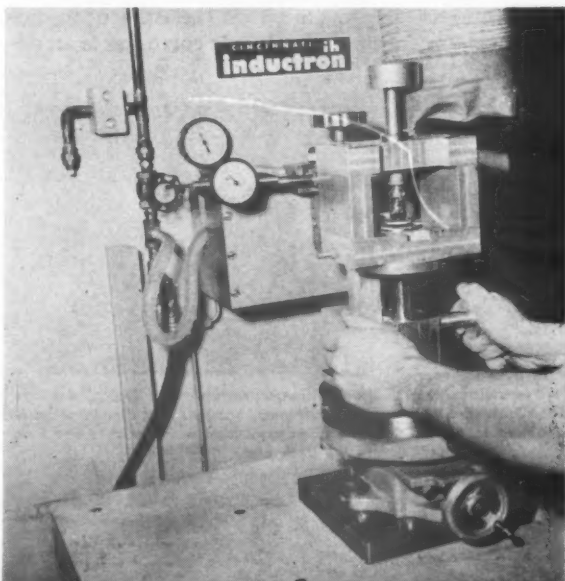
Because a particular adhesive has a curing time of only minutes, instead of days, the Waterman Pen Company in Seymour, Conn. has eliminated a costly assembly line bottleneck.

The two barrel sections of the model CC-298 cartridge fountain pen are joined with a coupling threaded at both ends. In order that the user will remove only the upper barrel section to replace cartridges, the lower section must be cemented to the coupling. While most adhesives provided a sufficiently strong bond, testing of the bond could not be carried out for several days due to the long curing times necessary.

Engineers found that Eastman 910 permits testing and completion of the assembly operation within minutes. Small polyethylene bottles set in cradles just above the assembly point dispense the liquid, one ounce of which will assemble 1000 pens.



Rapid set time of Eastman adhesive, applied to the coupling being screwed into the barrel of a fountain pen, permits immediate bond testing.



INDUCTION HEATING EASES BRAZING JOB

Precise control often spells the difference between a correctly brazed joint and the destruction of an accurately adjusted, completely assembled instrument.

The sensitive parts being brazed on a Cincinnati induction heating machine are pressure transducers, made by Statham Instruments, Inc., Los Angeles.

Contributing to the success of the operation is the Inductron's ability to bring the joint up to required temperature rapidly. Sometimes heating time is only .2 of a second. The machine is designed to generate a high frequency output—up to one million cycles per second.

Some 150 sizes and styles of transducers are

continued

HOW

*to know you're
getting the quality
you want*



for the hard case you must have in tapping screws. Without heat-treating to just the proper depth, the fastener lacks hardness and threads strip. Consistent uniformity of high-quality materials is one fundamental of proper case hardening. You get this consistent quality in American fasteners.

for the resilient core that must be under the case. Without this resilient core to absorb impact, heads or shanks shear in driving. Result: damaged parts from cracked fasteners, extra costs out of profits to replace the fasteners. Heat-treating at American gives you both proper case and core because we give constant attention detail.

**Profit
Improvement
Program**

Quality fasteners cost more to produce... improve your profits when used!

Buy here

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SCREW COMPANY

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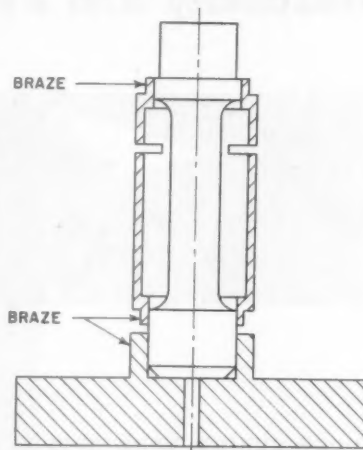
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Assembly and Fastening Ideas, continued

brazed by this 15 KW unit. Since setup changes are frequent, a record is kept of the precise settings on different tubes. Also, since heating characteristics of a coil can be varied by the output transformer, it is not necessary to stock separate, accurately formed coil for each type tube. Only 25 coils are required to braze transducers handled by this machine.

The operator controls the heating of the coil by rotating a graduated dial which "tunes" the coil to the setting required to restrict heat to the area to be brazed. The rapid and concentrated application of heat to this area makes it possible to hold the total heat input to a minimum which can be

dissipated after brazing without damage to the sensitive elements of the transducer.



AIR TOOL ATTACHMENT DEVELOPED TO TRIM BLIND RIVETS



A new approach to trimming blind rivets incorporates an attachment to right-angle drive air tools which moves over the work surface in the same manner as a flat iron.

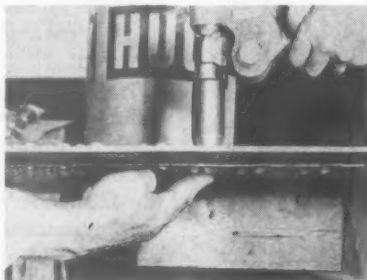
The Doeden trimmer, developed for aircraft, appliance, electronic chassis, has a large guide surface which assures that the circular saw cutter maintains correct cutting attitude. The rivet stem is trimmed square which saves time in the shaving operation.

NAVY ADOPTS LOCKBOLTS FOR DESTROYER REPAIR PROGRAM

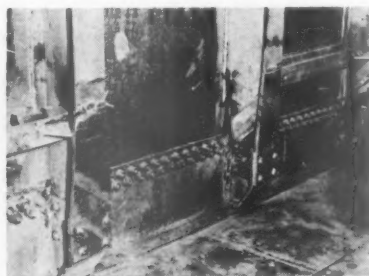
A Navy destroyer repair program now under way utilizes stainless steel lockbolts when replacing other aluminum fasteners in critical structural areas which have weakened or failed in service.

The new specifications are primarily designed to increase shear strength and stiffen the structure. Rated shear strength for stainless steel fasteners is 70,000 psi. Improvement in resistance to potential galvanic corrosion is an ad-

continued



Finger pressure is sufficient to buck fastener pin during installation with a hydraulic power tool. In this view, 1/2" Huckbolt fasteners are being used to attach steel coaming to aluminum sheets.



Internal superstructure of a typical destroyer after stiffeners, brackets and aluminum sheets have been assembled with lockbolts and fixed to the deck plate.

ditional beneficial effect claimed.

Lockbolt repair operations are under way at Puget Sound Bridge & Dredging Co.'s yard in Seattle, Washington. The $\frac{3}{8}$ " and $\frac{1}{2}$ " diameter fasteners used here are fabricated of 300 series stainless steel. Automatically installed with hydraulic power tools, the lockbolts are uniform and permanent.

G.E. WELDS RELAY TO CUT CONTACT CONTAMINATION



New welded relay has mechanical life of 10 million operations and electrical life at rated load of over 200,000 operations.

Contact contamination—one of the greatest problems in achieving relay reliability—has been significantly reduced by the use of all-welded construction in a General Electric micro-miniature relay.

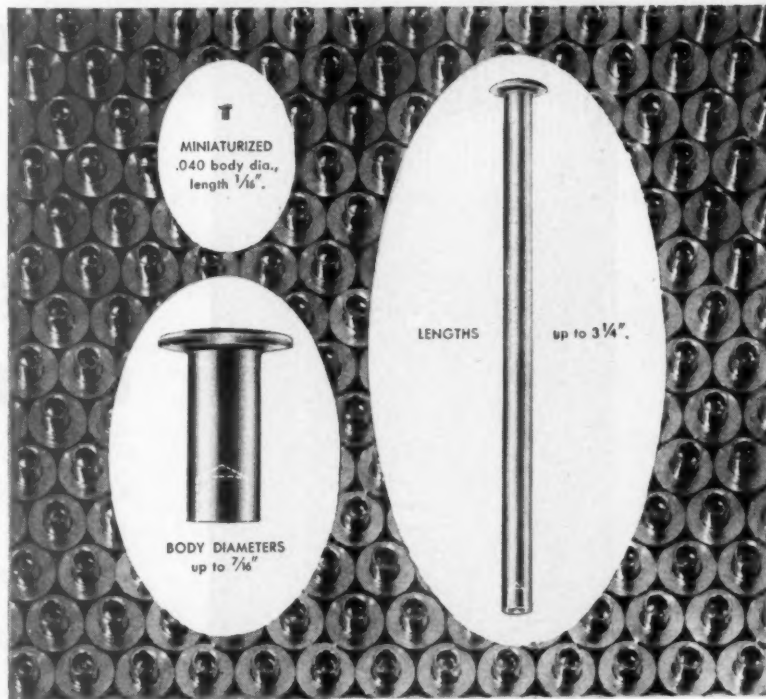
The new four-pole, double-throw relay is assembled by an inert arc welding process which hermetically seals the header to the can.

Weighing about one ounce, the relay is well suited for high-temperature installations. The internal structure includes ceramic actuator and ceramic coil spool. The relay is rated from 160 degrees C continuous ambient down to -65 degrees C.

Circuitry is symmetrical and wiring has been simplified, according to General Electric engineers. Socket mounted units may be turned end-for-end and cannot be plugged incorrectly. No polarizing pin is needed. The relay may be mounted directly on a printed circuit board or on a chassis.

The relay withstands vibration tests to 2000 cycles per second at 30 G's and shock tests at 50 G's for 11 milliseconds. •

Look at this Size Range of Semi-Tubular Rivets... it's the way to lower cost



Miniaturized components and also large complete assemblies can now have all the money-saving advantages of using single and multiple automatic riveting. This is due to the wider size range of semi-tubular rivets now available and which can be used in conjunction with motor and pneumatic driven automatic riveting machines.

Today, there is hardly a fastening problem, involving even fragile materials, that does not warrant consideration of low-cost semi-tubular rivet setting.

Our Factory Riveting Specialists are ready to help you obtain the REAL COST FACTS on your own specific fastening problem. There is no obligation.



FOR YOUR FILES

Chicago Rivet Catalog describes 1388 standard tubular and split rivets and 25 single and multiple automatic rivet setters.

AIR-POWERED RIVETING

contains description and specifications of 8 single, multiple riveters—also rivet setters designed for automated operation.



Chicago Rivet & MACHINE CO.

946 So. 25th Ave., Bellwood, Ill. (Chicago Suburb)

Branch Factory: Tyre, Pa.

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HIGHER PRE-LOADS . . . LESS INDENTATION WITH H-K'S NEW 1960 SERIES FORGED SOCKET HEAD CAP SCREWS

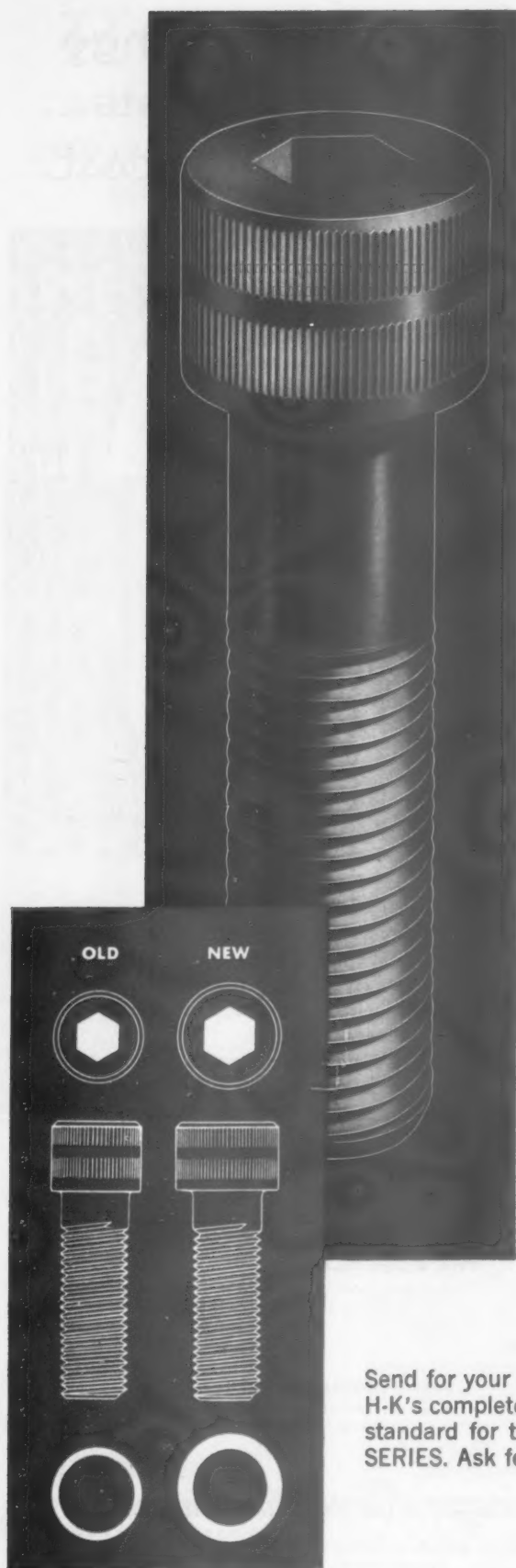
- LOAD DISTRIBUTED OVER WIDER BEARING SURFACE
- HIGHER PRE-LOADS
- INDENTATION UNDER HEAD ELIMINATED
- SMALLER, FEWER FASTENERS REQUIRED
- INCREASED VIBRATION RESISTANCE
- ENLARGED SOCKET IN MANY SIZES
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HOLO-KROME SOCKET SCREWS

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SOLD ONLY THROUGH AUTHORIZED DISTRIBUTORS

Send for your FREE copy of H-K's complete dimensional standard for the new 1960 SERIES. Ask for Form CSN.



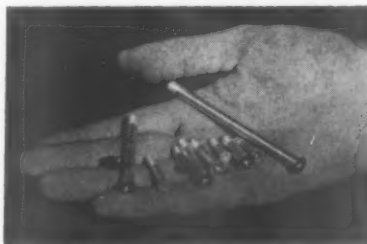
REPORTS FROM THE FIELD



X-15 ROCKET RE-ENTRY FLIGHT TO IMPOSE SEVERE TEST ON FASTENER COMPONENTS

North American Aviation's fabulous X-15 rocket is a craft whose design allowables, as one report stated, "... are based on almost perfect materials."

When the plane makes its unprecedented manned flight into outer space and back, severe tests

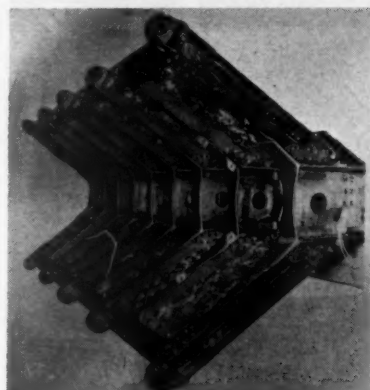


A few of the flush-headed aircraft bolts used in the X-15.

will be imposed on all components, including the rivets and bolts which hold together 35% of the airplane.

For extreme-service projects like this, the American Screw Co., Willimantic, Conn., has developed a special fastener. The Torq-Set aircraft bolt (also represented in the Atlas ICBM), is flush-mounted to assure laminar airflow and minimum drag. Cold-headed from Allegheny Ludlum's A-286 alloy, the bolt resists temperatures up to 1300° F. Its high strength permits extreme torque prestressing to enhance fatigue characteristics.

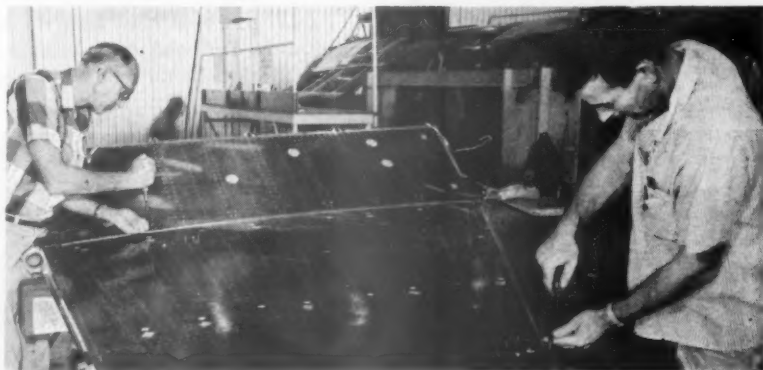
Many sizes and types of the Torq-Set are used in this research



The wing-attach structure is assembled with interference fit rivets with A-286 alloy pins.

craft, in structural areas such as the wings and in the ejection seat and other equipment.

Also adopted for assembling the X-15 is a rivet which has served well since invention in 1942. Design advantages for the Hi-Shear include compactness, lightness and quick installability. Made by the Hi-Shear Rivet Tool Co., Torrance, Calif., the rivet is used in the A-Frame structure assembly which attaches the wing to the fuselage. The wing spars have spar caps attached to web sections with Hi-Shears, and the landing flap fitting and wing skin also use this fastener.



North American Aviation employees install high-temperature fasteners in the wing of the X-15.

STEEL CLIP SPRINGS BACK INTO ORIGINAL SHAPE AFTER FLATTENING, FLEXING



A steel clip made by the Hunter Spring Co., Lansdale, Pa., has the unique capacity to be repeatedly opened and closed without taking a permanent set. While ordinary clips would be permanently deformed if flattened out, Neg'ator clips can be opened to their full

continued





simplify
machining,
speed assembly
with

INDUSTRIAL RETAINING RINGS

Eliminate costly tooling and machining...speed assembly...by using precision-made INDUSTRIAL Retaining Rings. Available for immediate delivery in types, finishes and sizes exactly right for your job.

Send for catalog and free samples.

Ⓒ SERIES 1000—External Rings*

Ⓒ SERIES 2000—External Rings*

Ⓒ SERIES 3000—Internal Rings

Ⓒ SERIES 3100—External Rings

*Also available stocked for speedier application.

All series except 2000 available bowed for resilient take-up of end play.

IRR

Originators of modern retaining ring dispensing.
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Reports from the Field, continued

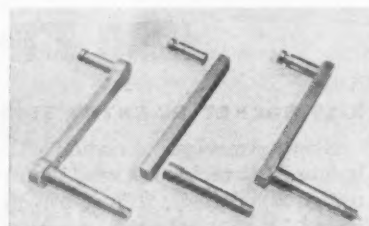
length and, when released, will return to their original shape. They can be used as retaining bands when snapped onto shafts or similar members where access by way of shaft ends is not practicable.

The clips are strips of spring material which have been highly prestressed to a given curvature. When expanded slightly from this natural diameter they exert an exceptionally strong embracing force.

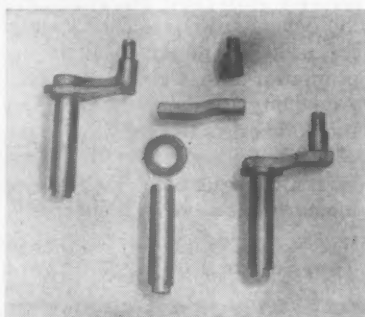
FARM TOOL FABRICATOR CUTS COSTS BY RESISTANCE WELDING

Farm implement manufacturer Massey-Harris-Ferguson switched to a resistance welding fabrication process when studies and pilot production runs promised savings of 10-40% per piece part and 60-90% in time over prior methods. These standards are being realized.

In an industry characterized by short run production of a multitude of different assemblies, the large Canadian firm cut costs by



A belt tightener was once assembled by brazing screw machine parts to a forging. Savings of \$1.25 per assembly are realized by substituting ordinary bar stock and resistance welding.

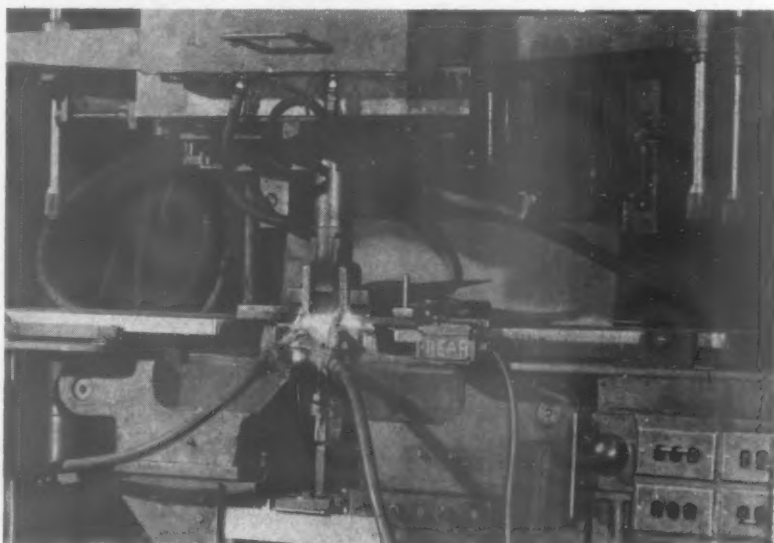


Resistance welding has saved \$.65 per bell crank over time consuming malleable casting (left). Hot press formed stock is now coined and welded to parallel pins.

minimizing set-up time and simplifying tooling and fixturing.

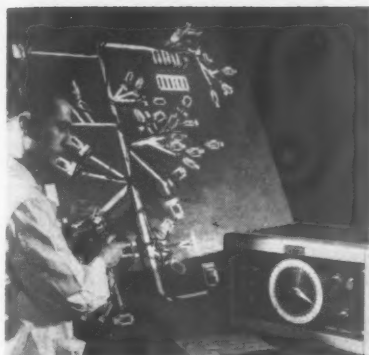
Eight types of resistance welds, effected by three heavy-duty Sciaky machines, satisfy requirements at M-H-F. Basic tooling and fixturing are built into each welder, with maximum cost today of \$75 for any one farm assembly made. Set-up time averages 30 minutes for an assembly.

Parts previously forged or cast were reduced to fabricated assemblies of standard sheet or bar stock and screw machine parts.



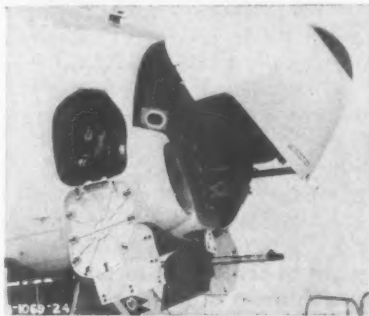
Three-phase Sciaky welder assembles a yoke. Note universal fixturing table and mounting of simple dies for these parts.

Assembly and Fastener Engineering



THE WIRING HARNESS for the front end of an auto undergoes a 67-point test at the Mercury-Edsel-Lincoln quality control center at Wayne, Michigan. Placed on this check board, the harness is then connected to the electronic checker at the right. Each check point is numbered to correspond with the numbers on the dial. A faulty wire or connection or bulb will stop the dial indicator so the inspector can make a note of it.

LATCHES SEAL DC-8'S TURBO-COMPRESSOR CABIN



Visible on the door of the DC-8's turbo-compressor cabin are 10 air-tight latches.

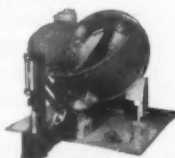
In the DC-8's nose alone, 39 M-3000 latches, made by the Missile-Air division of United States Chemical Milling Corp., give access to cabin air turbo-compressors. Constructed with built-in grommets, the flush-type, trigger-action latches combine easy opening with air-tight closure.

Douglas engineers emphasized the importance of a positive seal by pointing out that the slightest leakage in the surface of the aircraft-skin produces as much air drag as a 10-penny nail projecting into the slip stream. While only finger-tip pressure is required to open latches on ground, they cannot vibrate open accidentally in flight because of positive over-the-center locking.

In addition, latch is light weight (1¾ oz.) and corrosion resistant, constructed of stainless steel and aluminum alloy.



VIBRATORY FEEDER for light, fragile or highly finished parts.



ROTARY FEEDER for high production feeding.



ROTARY HIGH SHELL FEEDER for maximum holding capacity.



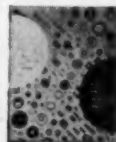
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DPS selective feeders

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BUILDING THE DC-8 JETLINER

Two massive buildings—one for structures assembly and the other for final assembly—were designed so as not to impose any limits on the most efficient assembly methods

When the DC-8 made its maiden flight last year, it culminated 12 years of study of every phase of the jet transport problem. There was no prototype airplane. The first one took to the air while assembly operations were under way on number 14.

The DC-8 assembly facility, an integral part of our Long Beach division, was planned so that space would not impose any limits on the most efficient production methods.

This \$20,000,000 facility, first to be built for the exclusive manufacture of commercial jet transports, embraces a total of more than 26 acres.

It consists of two massive buildings, one for structures assembly and the other for final assembly, plus three smaller service buildings, a paint building large enough to cover the entire DC-8 and an adjoining wing-tank sealing booth.

Production lines determined the size and dimension of the buildings. The wide bays, for example, permit assembly of the swept-wing as a single unit with only one splice on the center line of the airplane.

Largest of the two buildings is structures assembly—1144 feet long and 480 feet wide. It contains three equal bays of 160 foot span. The final assembly building is also 1144 feet long but has two bays, one 160 feet wide and the other 200 feet.

Structures assembly is 57 feet tall at its highest point and the final assembly building is 67 feet. Both ends of the buildings can be opened by means of power-operated hangar type doors.

TWO MAJOR GOALS IN STRUCTURAL QUALITY

In the production of the airplane, limited use has been made of integrally-stiffened sheet, chemical milling or plastic parts. Basically the proven methods of construction used in the DC-6/7 series of aircraft have been carried over. Long fatigue life and fail-safe assurance were the major structural quality goals in the design of the DC-8.

There are three commercial versions of the airplane—the domestic, intercontinental, and extended range models. The last two feature increased wing skin gauges and additional strengthening in other areas to accommodate higher gross weights. All versions have identical dimensions and utilize the same basic tooling.

Major research and development attention was devoted to the wing root design, both aerodynamically and structurally. Conventional bending loads on straight wings are transposed into bending and torsional loads on swept wings at the root section. This factor, in combination with the gust loading environment at the altitudes and speeds flown by the airplane, brings fatigue life to its critical values in the wing root. In order to eliminate joints and splices which contribute to fatigue problems, wing spar caps and plating are continuous across the wing root break station.

DC-8 inboard wing skins are stretch-formed across the sweepback and dihedral break. Like the spars and other members, the wing skins are tapered to provide minimum weight in areas of reduced loads, and maximum strength in areas of heavy and combined loading. The wing skin is thickest at the root and across the fuselage where there are high bending and torsional loads.

The wing is fabricated entirely of 7075 aluminum alloy containing 1.6% copper, 2.5% magnesium, 5.6% zinc and 0.3% chromium. All sheets are Alclad on both sides. In the domestic version, lower wing plating is roll-tapered from 0.230 in. at the root to 0.064 in. at the tip.

The wing box beam retains the Douglas traditional three-spar arrangement and comprises a complete, integral fuel tank. Spars have conventional sheet webs with riveted vertical stiffeners and 7079ST forged spar caps at the inboard ends that are completely machined. Outboard spar caps are machined from 7075 extrusions.

Wing ribs are of formed 7075S sheet with tab segments along their periphery. These tabs are tied into the skins by clips milled from 7075S forgings. Each wing box beam section is divided into four individual tanks separated by solid bulkheads. When the two wing sections are joined with top and bottom splices, a ninth tank is created by the wing junction. The wing halves thereby create a complete integral wing with a minimum of joints and splices. This design resulted in considerable weight savings over previous configurations. It also improved fatigue resistance.



During wing tank assembly operation, specified areas are hand filleted with Thiokol sealing compound. This brown paste cures in about four hours at room temperature. This operation is accomplished in wing tank assembly jigs which are 80 feet long with three working levels. They can accommodate four sets of wings simultaneously, each of which can be drilled and riveted from front to rear spar without removal. For efficiency, working crews are alternated, with drilling operations underway on one set while riveting is done on the other. An extensive venting system assures safety and comfort for the workers.

After the wing sections are assembled, they are lifted out by one of the traveling cranes of an extensive network which can transport an assembly any place in the building. After placement in the trailing edge-to-tank assembly jig, the pylons, trailing edges and flap hinge fittings are attached.

The sections next are lifted vertically and moved into a horizontal position for the joining of the right and left hand wing sections at the center line of the airplane. During the mating of the wing halves, the final tank sealing and testing is accomplished.

At this time the wing weighs 27,610 pounds. From one closing bulkhead to the other the length is 136 feet without wing tips. Range in chord of the wing is from 340 inches to 74 inches.

It is then placed on a dolly to carry it out of the structures building for movement to a separate building where 0.001 inch of protective top coating is applied to the interior of the tanks by a fill and drain method. The entire wing is installed on a massive tilting platform and the tanks are filled. Two hydraulic cylinders, each with a diameter of 14 inches and a seven foot stroke, tilt the wing 10 degrees up and down to insure complete coating of the interior. After the mixture of synthetic rubber compound and solvent is pumped out, hot air is circulated through the interior to cure the coating. The wing had been checked for leaks previously by using the standard "soap-bubble" technique.

DRILL AND RIVET IN ONE OPERATION

Another measure to extend the fatigue life of the DC-8 wing is demonstrated in the automatic drilling and riveting of skin and stringers in one operation on Drivmatic machines to assure uniformity and even distribution of stresses. With this type of construction, the entire DC-8 wing tank assembly becomes a single structure of unique integrity and strength. The National Aeronautical and Space Administration riveting method is used.

The DC-8 incorporates the well-known principles of Douglas fail-safe design. In the tubular pressure

continued

Building the DC-8 Jetliner, continued

cabin, titanium rip stop doublers reinforce the external skin at strategic frames and surround every door and window. Among the fail-safe features—window frames are solid, tapered, and blow-out proof and fabricated from a single piece of aluminum stock.

Where testing has indicated unusual stresses, holes are coined to increase fatigue life by reducing stress concentrations.

HIGH TENSION FASTENERS IN FUSELAGE

High tension type fasteners are used throughout the DC-8 fuselage. Lockbolts, for example, fasten the window frames to the fuselage assembly.

In attaching fuselage skins to frames, stringers and doublers, the NASA riveting method again is used. This work is accomplished by using Douglas-designed Manco Crispin riveting machines. These semi-automatic machines make a uniform fastening while a clamping action holds the members together under a pressure of 1750 pounds per square inch. On the external surface, rivets are upset into countersunk cavities and shaved smooth. Sealing qualities and fatigue life are greatly improved by this method and there are no irregularities on the exterior of the cabin to cause drag.

In flight, jet engine noise is barely audible forward of the engine tailpipes; but to the rear of the passenger compartment, extensive weight penalties in non-structural sound proofing would have been required if Douglas engineers had not tried a new design concept. Structural engineers asked them-



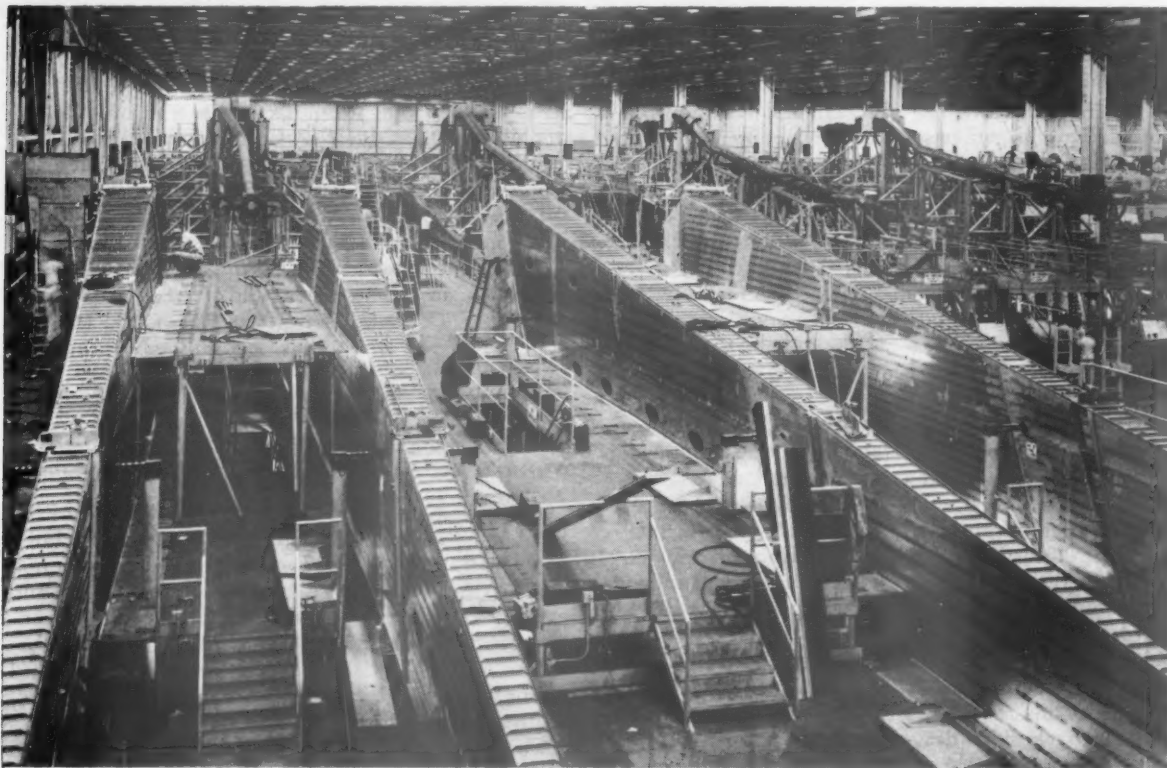
Sealing compound is hand-filletted into wing tank joints.

selves this question. "Since mass of material is being sought, why not use metal for sound alleviation in the aft section?"

Following extensive tests this simple concept proved to be an ideal solution. In all DC-8's the rear portion of the fuselage is lined with extra thickness plating and closely spaced longitudinal stiffeners of a flattened hat-section. This proved desirable because of the longer fatigue life obtained for the aft fuselage with no increase in weight penalty.

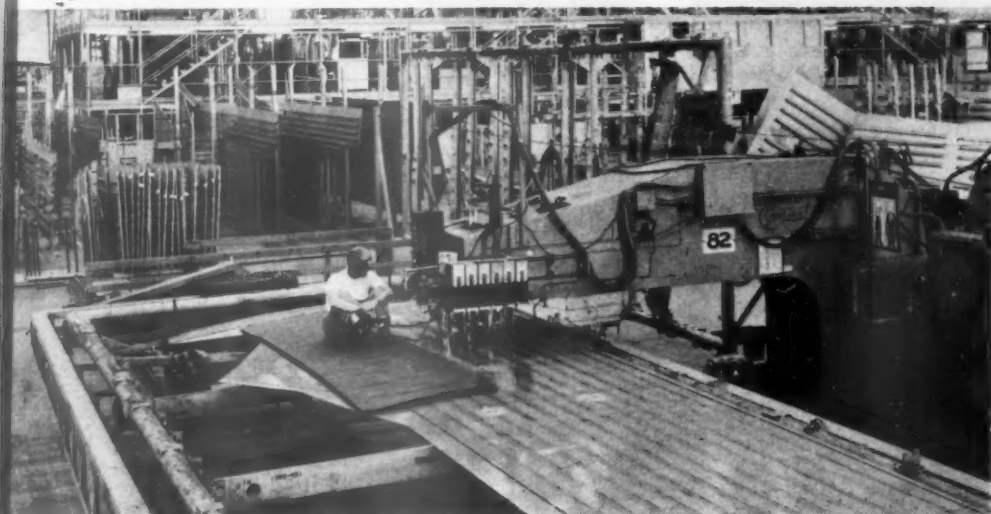
The aft fuselage is covered with 7075ST skin, and the forward area, which is supported by conventionally spaced stiffeners, is covered with 2014ST skin. The stress level in the aft section is only about one-half that of the forward area. Skin gauges in the forward portion are typically 0.060 in. and those in the aft section typically 0.080 in. A minimum skin thick-

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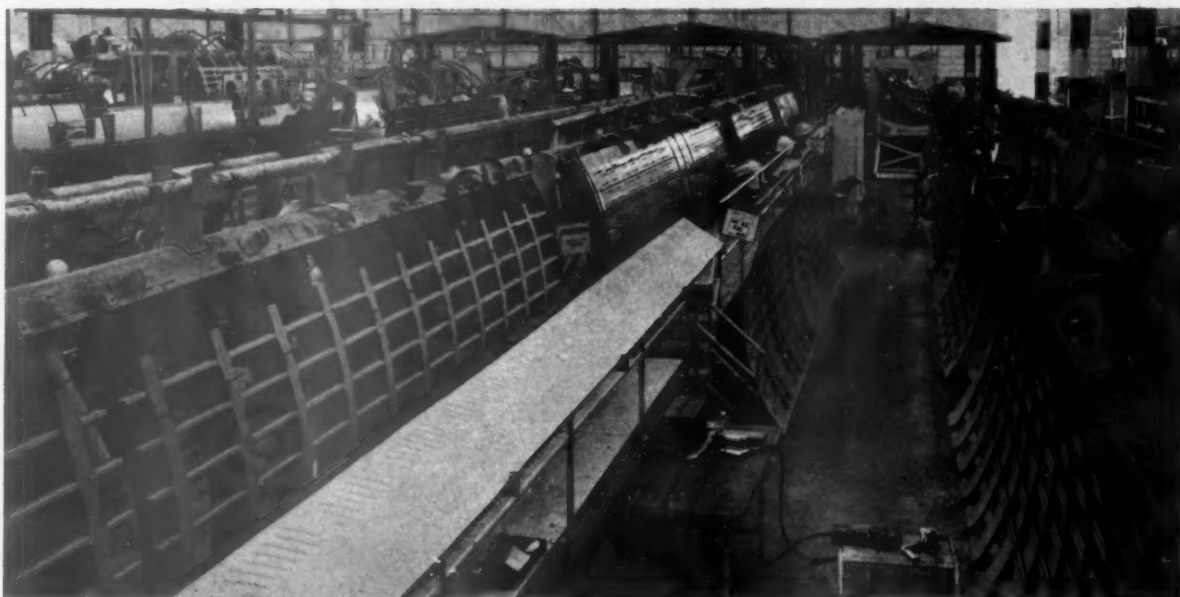


These wing tank assembly jigs have localized ventilating system to assure comfort of drilling and riveting crews.

In this area the right and left wing halves are joined together at the centerline of the airplane fuselage. Centerline-joining eliminates wing roots on each side of the fuselage and provides a stronger overall structure.



Automatic drilling and riveting of stringers and skins are done in one operation to assure uniformity and even distribution of stresses. The NASA riveting method is used.



The titanium rib stop doublers used in critical areas of the huge tubular pressurized fuselage can be seen in this photo.

Building the DC-8 Jetliner, continued

ness of 0.050 is used in the pressure cabin section.

The lower fuselage, which is built in two sections, contains 16 panels. The sections are constructed in an upside down position and secured in turning rings to place them physically in their proper positions. They are transferred next to dollies before movement to the fuselage joining line.

Special fixtures were attached to the lower sections during assembly. They are used subsequently through the lower half pick-up, turn-over position, fuselage joining line, fuselage installation line, and ultimately the wing-to-fuselage joining position. Once attached to the lower sections, they need not be removed. They are used to index, carry, handle and support the structures through all of the fuselage major positions plus the critical wing and fuselage joining position. This concept is a valuable time saver in production because it eliminates non-productive time, changing tooling handling fixtures, and also reduces the hazard of handling these large sections to a minimum.

The upper fuselage, containing 18 panels, has stretch-formed, rolled or extruded "Z" transverse frames which are flush-riveted to the skins.

After completion as a continuous section, it is hoisted into position directly above the two lower sections in the mating jig and the fuselage is riveted together.

The nose section is manufactured in three major sections: lower nose, upper nose, and cockpit enclosure. Material is 0.050 inches 2014ST throughout, with the exception of a 0.100 inch panel above the cockpit.

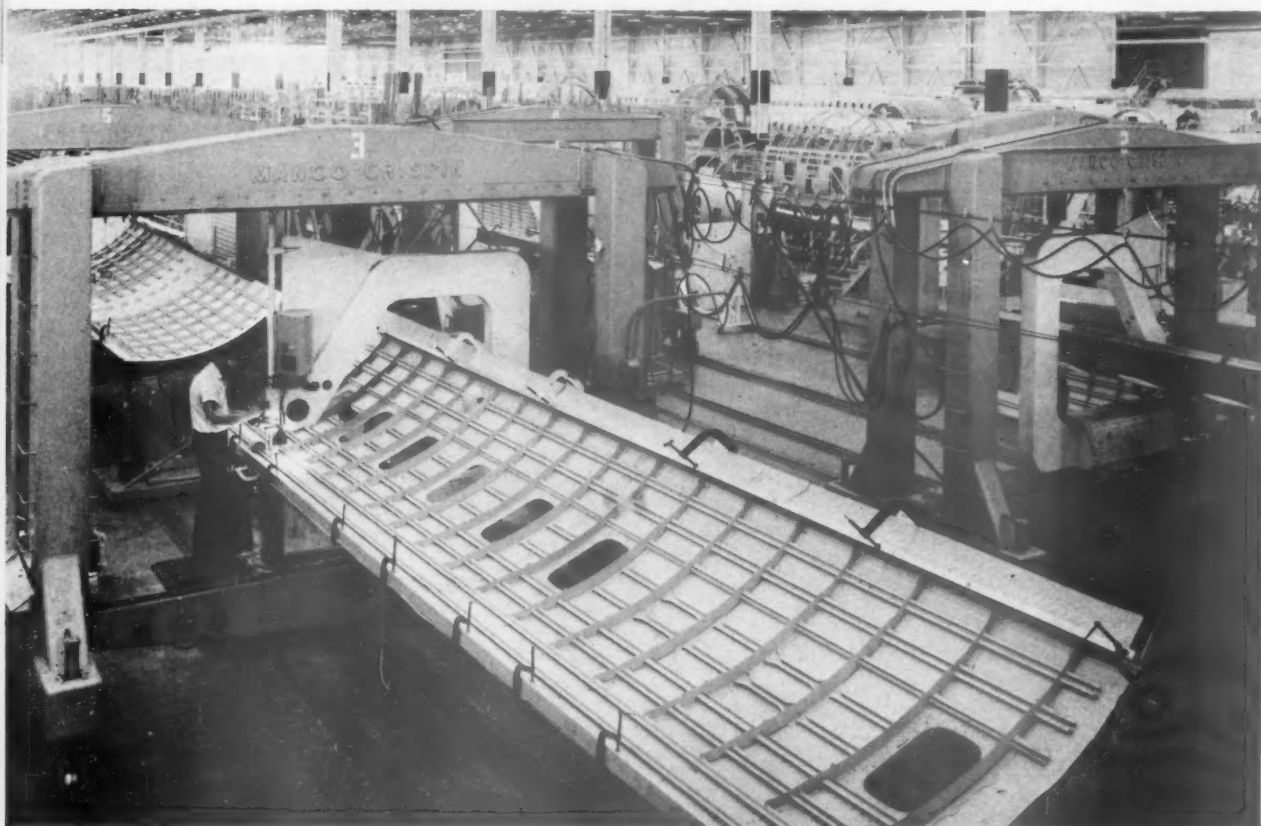
When fuselage line movement reaches the nose sub-assembly area, nose and fuselage are joined together. The entire fuselage length at this point measures 125 feet. It is 162.5 inches deep and 147.0 inches wide with an upper cabin radius of 73.5 inches. Radius at the lower cargo compartment is 68.68 inches. It weighs approximately 19,000 pounds, including the nose equipment items. This does not include doors, windows or floor panels.

When this phase is completed, the fuselage moves sidewise to another track and through several fuselage installation positions. It then proceeds rearward through a paint booth where it receives appropriate customer markings.

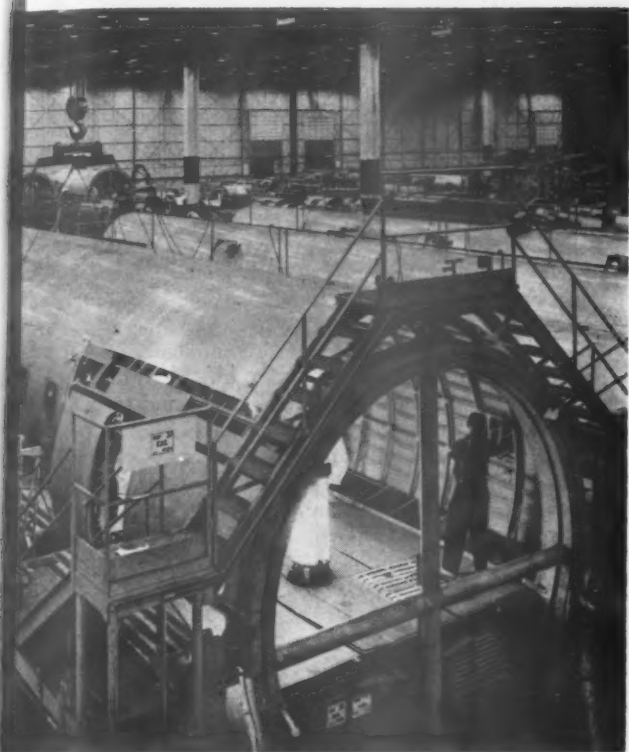
Long Beach division's tooling section designed and built two fuselage dollies for transferring the large assembly from the structures building to prevent strains on the fuselage. It is moved by tug and tow bar with steel casters riding over a V track welded to steel plate.

After the fuselage has been moved to final assembly, it is lifted on slings to await mating with the swept wing. The relative ease with which this is accomplished, in only a few minutes, is one of the supreme tests of the production process and of the engineering behind it.

continued



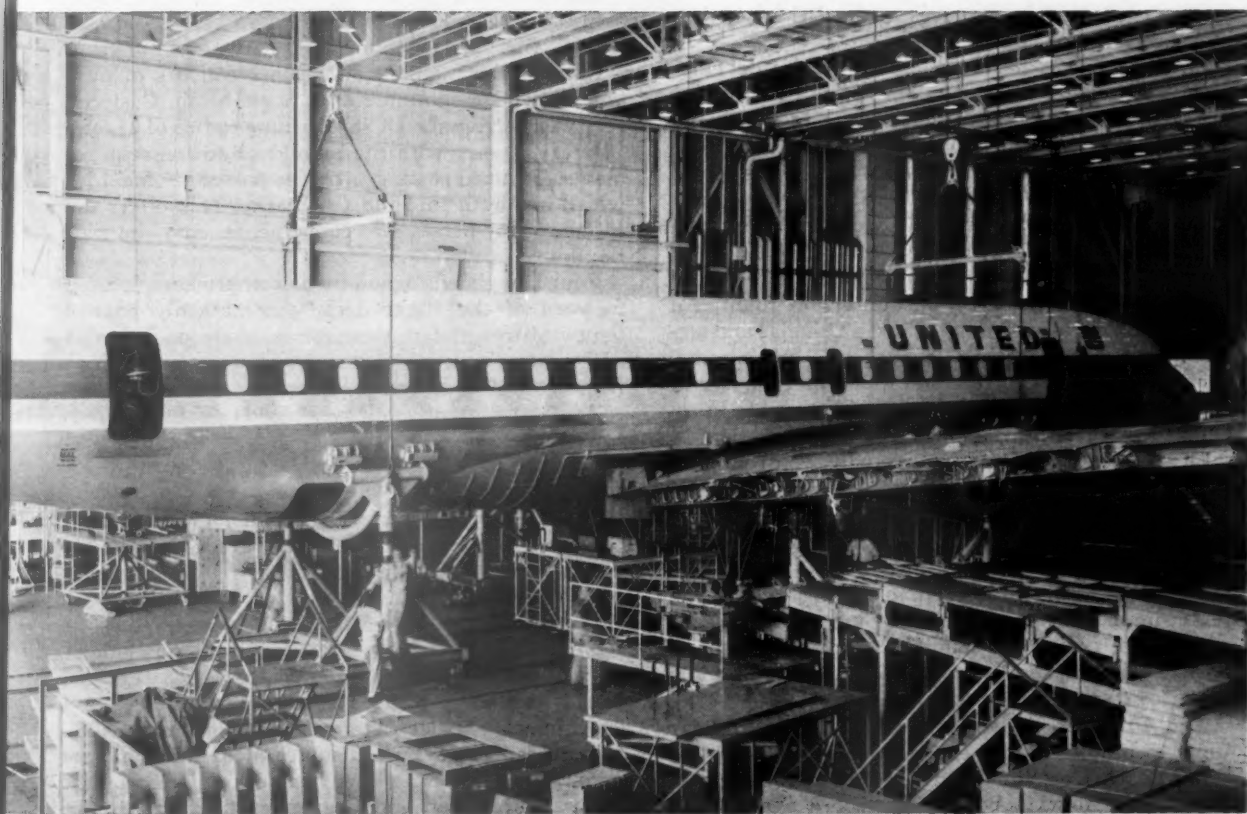
Semi-automatic machine rivets fuselage sections while parts are clamped together under a pressure of 1750 psi.



Overhead crane lowers upper section of fuselage for mating with the lower section. They are then riveted together.



Here the nose and fuselage are joined together. At this point the entire fuselage measures 125 feet long.



The completed fuselage is lifted on slings for mating with the swept wing. Operation is done in only a few minutes.

Building the DC-8 Jetliner, continued

There are 13 positions in final assembly, twelve within the assembly building and one outside where each fuselage completes a pressure check before going down the final bay. Each cabin is proof-tested to 12.33 psi. At normal operating pressure of 8.77 psi the cabin leakage rate must not exceed 150 cu. ft. per minute.

Following this operation, the airframe moves back into final assembly for additional installations and to receive its tail assembly. This is an integral unit containing laminated plastic isolation band panels for HF, VHF and VOR flush antennae.

Irregularities on control surfaces affect aerodynamic characteristics of individual airplanes. They affect the stall characteristics, for example, and so they should be kept to a minimum. At the Long Beach division such irregularities have been reduced by maintaining full contour control on the control surface assembly jigs.

BOND ALUMINUM HONEYCOMB TO VANE SKIN

An interesting production technique is employed in the trailing edges of the wing and control surfaces. As one example, a billet of unexpanded aluminum honeycomb is milled into a flap vane templet and expanded to full scale in all dimensions. It is inserted in the formed vane skin and bonded to provide a lightweight structure of extreme rigidity and fully-controlled contour.

Smooth surfaces and closely fitted joints are characteristic of all the structures in the DC-8 whether they are large or small.

Equal emphasis has been placed on the development and testing of the systems of the DC-8. The extremes of altitude and temperature in which the airplane operates put new demands on cabin pressure and air conditioning systems. These were tested for more than a year on a full-scale pneumatic system's mock-up, and with cabin sections in environmental chambers.

Actually, test facilities can reproduce more severe conditions than the DC-8 encounters in flight. An elaborate control system jig allowed Douglas and airline pilots to test the DC-8 hydraulic and manual control forces for coordination in a wider variety of flight load conditions than would be possible in an actual flight test program of reasonable duration.

DC-8 elevators, which are manually controlled by cables, employ spring control tabs for aerodynamic boost. Hydraulic pressure controls the powered rudder, but mechanical control is automatically available in the event of hydraulic failure.

It is interesting to note that, during hydrostatic tests, simulating more than 120 thousand flight cycles of take-off, cruise and landing, a single DC-8 pressure-cabin withstood cycles of load exceeding 100 years of normal operation.

The Pratt & Whitney powerplants, last major units to be joined to the airplane, are delivered to Long Beach from the Ryan Aeronautical Company. The DC-8's four turbojet engines are available in three basic types, the Pratt and Whitney JT3C and

JT4A, and the Rolls-Royce Conway by-pass engines. The latter is built-up at the Douglas Santa Monica division.

Ryan fabricates the engine pylons and pods, making extensive use of titanium for its superior structural strength and heat resistant properties.

Both pylons and wing center sections are assembled against master gauges to assure fit and interchangeability.

The complex nose cowl and assemblies contain the anti-icing ducts and the blow-away jet device for protection of the engine impeller blades against damage while taxiing or during ground run-up.

In order to provide the aerodynamically clean surface demands of the DC-8 design, the titanium skins are spot-welded to eliminate rivets and screws from the cowl and pod doors.

When the components and accessories are assembled, the completed engine pods and pylons are inspected and approved by Ryan, Douglas, and Federal Aviation Agency inspectors.

For three years, the Douglas company engaged in the development, design and testing of a combination noise suppressor and thrust brake for the DC-8. Nearly nine hundred variations were tested and the production version was selected on the basis of obtaining the best balance between sound reduction, thrust loss, and drag in an installation compatible with Douglas reliability and safety standards. Sound reduction is accomplished by the fluted pattern of the engine exhaust nozzles, in combination with the retractable ejector.

Thrust braking is done by rotating clamshell-type doors to a closed position with the ejector fully extended, thereby deflecting the jet exhaust forward.

Each of the main landing gears consists of dual tandem wheels mounted on a bogie beam. Castored rear wheels give the DC-8 a turning radius of 91 feet.

Interiors vary with the individual airline requirements. Unitized seating provides passenger facilities which are built into the seat backs. This offers the ultimate in passenger convenience and interior flexibility.

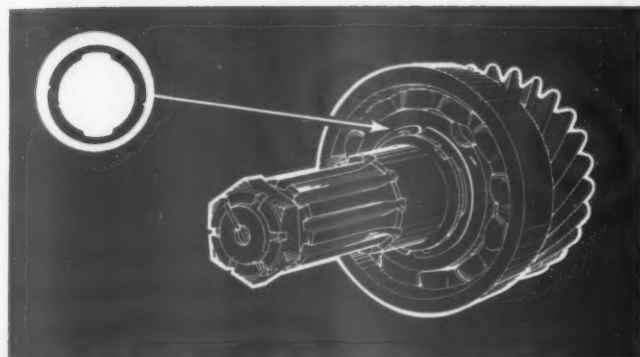
Four Douglas-designed turbo compressors, located forward of the flight deck, automatically control temperatures and pressurization. A most desirable and unique feature of the interior is the radiant heating of all side panels.

After the airplane leaves final assembly, it is towed to the adjacent paint shop. After painting, it is ready for check-out of all systems on the ramp prior to flight.

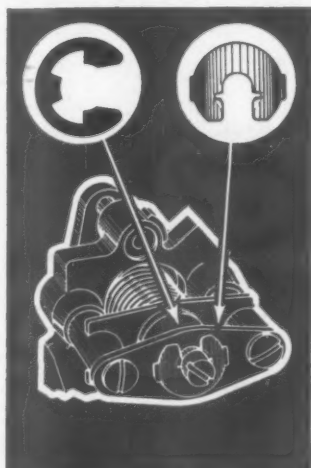
The DC-8 represents a big technological advance; therefore the extremes of speed, altitude and temperature in which it operates place unusual demands on quality control throughout the manufacturing process.

The DC-8 Jetliner was designed by the engineering staff of the Douglas Santa Monica division and they retain engineering responsibility for it.

Although engineering and production responsibility are separated by a distance of 31 miles, no co-ordination difficulties have been encountered by the thousands of men and women participating in the program.



Heavy duty transmission design simplified. On this dual axle drive for trucks, a Truarc Series 5107 ring locks bearing on drive shaft. Interlocking ring design won't dislodge under heavy torque . . . is also recommended for high rpm. applications.



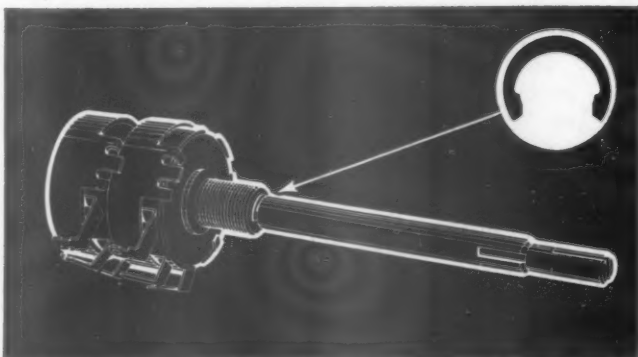
Rings replace machined shoulders, collars, set screws.

That's what original design of this pneumatic temperature transmitter called for. Series 5139 Prong-Lock® ring with bowed design compensates for accumulated tolerances in parts, provides sufficient friction to prevent rotation under vibration. At the same time two Waldes E-rings position and lock adjustment screw to face plate.



Reinforced aluminum ring gives design advantages on louver windows.

Waldes Truarc Series 5144 reinforced rings of aluminum secure hinge pins, eliminate costly riveting in linkage of louver type window. Ring design provides large bearing shoulder. Reinforced construction has 5 times the gripping strength of standard E-ring construction, allows use of non-corrosive aluminum.



Ring acts as locking shoulder. Holding the threaded ferrule on this potentiometer shaft is a Truarc Series 5103 Crescent® ring. Crescent ring design with low shoulder provides ample clearance for assembly of panel locknut. It is less costly than a machined shoulder, more effective, quicker to install, easier to remove than the C washer previously used.

Designing with radially assembled Waldes Truarc retaining rings

solve varied product design problems—save machining, materials, parts and labor

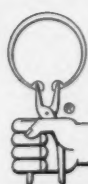
Radially assembled retaining rings, which snap onto a shaft at right angles to its axis, greatly extend the range of products on which retaining rings may be used to simplify design and save parts or labor costs.

For example, rings for radial assembly can be used in applications where it is impossible to install a ring axially over the end of a shaft. Certain types are designed to accommodate shafts of relatively wide tolerances. Others described below may be used to provide a sizeable shoulder on a shaft.

The four applications shown here provide an indication of the wide range of products using radially assembled rings. The rings themselves are basic Truarc types each having specific design features. The high shoulder of one provides a large bearing surface on small diameter shafts; the low shoulder of another is ideal where clearance is limited. A third has an interlocking design which prevents it from being dislodged under torque or high rpm. A fourth can be used against rotating parts at the same time it provides spring tension.

These are but four of Truarc's fifty functionally different types of retaining rings with up to 97 sizes within a single type, six metal specifications and thirteen different finishes. Special hand, magazine, and semi-automatic applicators as well as grooving tools are also available to speed production. The entire line, together with over 70 typical applications, is described and illustrated in the new catalog RR10-58—yours for the asking. And call on us for design assistance on your specific project . . . a Waldes Truarc engineer will be glad to help. Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y.

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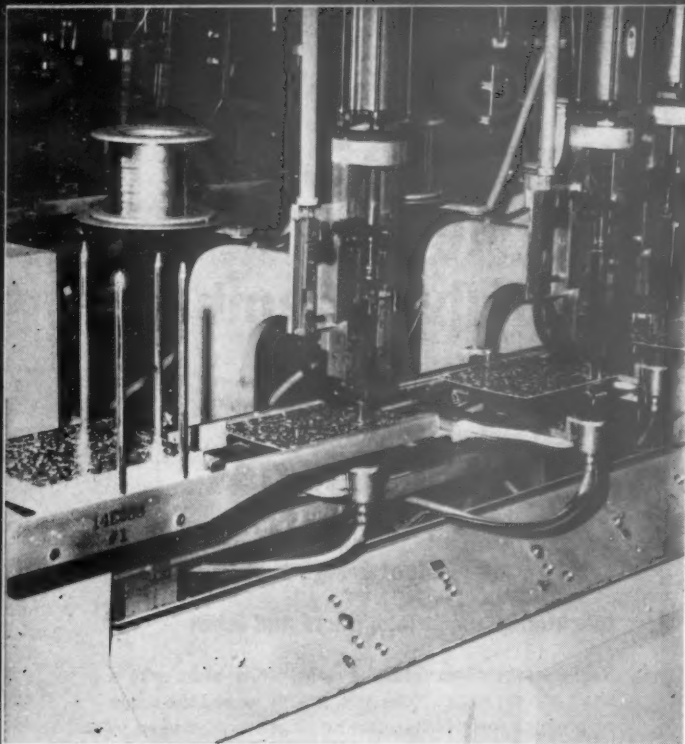


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TRUARC®
RETAINING RINGS**

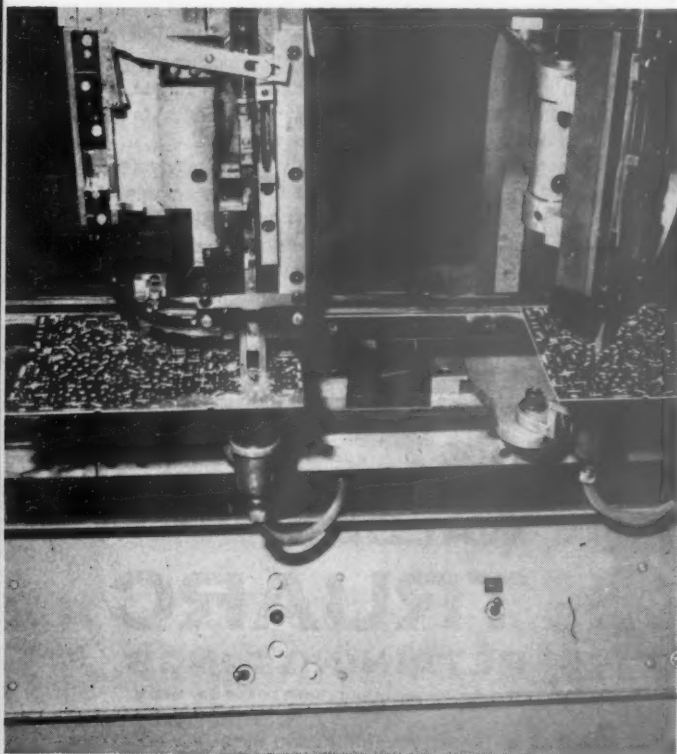
Waldes Kohinoor Inc., Long Island City 1, N. Y.

TRUARC RETAINING RINGS...THE ENGINEERED FASTENING METHOD FOR REDUCING MATERIAL, MACHINING AND ASSEMBLY COSTS

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Transfer line assembly heads are air-operated drivers which cut, form and insert wires into holes of circuit board. Air-operated jaws on underside spread outward to clinch wires in place. Electrical impulse signals if there is failure at any one of 28 stations. Boards are hopper-fed onto nylon track and moved from station to station by reciprocating bar at rear. The driver heads are fully adjustable toward front or rear of boards and by rotation to any desired angle as shown below. With simple set screw adjustments, a complete change of a whole line of new circuitry can be done in a few hours.



PRINTED CIRCUITS

Admiral has automated the assembly of jumper wires, resistors and terminal pins which account for 70% of total number of parts in one board

by Darrell Ward, Engineering Editor

Printed circuit assemblies need not introduce tedious problems for radio and tv service men or high cost for repair of expensive components in the customer's set. Disproving this age old argument by many uniformed people against printed circuitry, Admiral Corporation of Chicago, has moved right along in high rate production of printed circuit boards for their popular sets, and in each circuit provided a minimum of maintenance problems, improved reliability of functioning, and fast, economical replacement of parts which can go bad—if an intelligent service man works on the set instead of an electronic experimenter. Even the latter would have to be pretty stupid to make a hard job of servicing the printed circuit boards we recently saw being assembled in Admiral's plant at the rate of 1,000 a day.

The replacement of capacitors or resistors, for one example, would seem to be far simpler in Admiral's printed circuits than in the old-fashioned type of spider web wiring and tightly curled pigtails in the standard metal chassis construction.

Instead of digging deep under a stack of components, the service man finds every part standing up for immediate location and trouble shooting in one of these circuits. Instead of chancing the dislocation of other components or the breaking of nearby connections when he tries to uncurl a resistor terminal, the service man can clip the wire neatly above the board and solder a replacement to the standing wire. Or, he can easily unsolder the terminal below the board and flip it loose without damaging any other part or connection in the entire orderly layout.

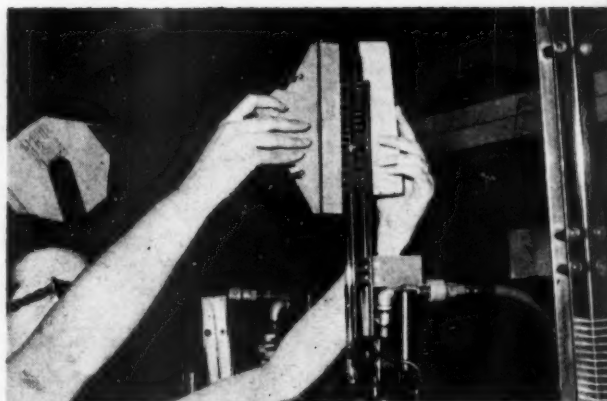
Every part stands upright, virtually free and clear of its neighbors. Tie points and jumper wires eliminate the usual confusion brought on by twisting and soldering terminals from numerous parts at one point. Yet, all this efficiency and orderliness—which

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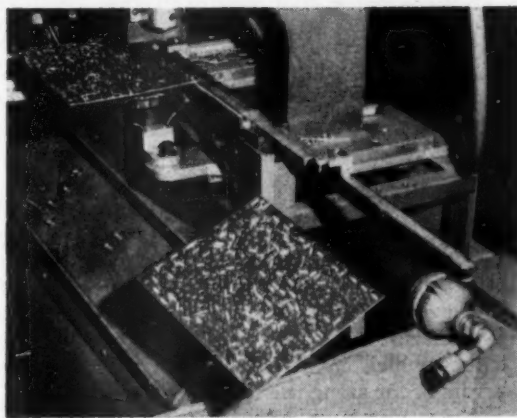
TS FOR TV: EFFICIENT AND RELIABLE



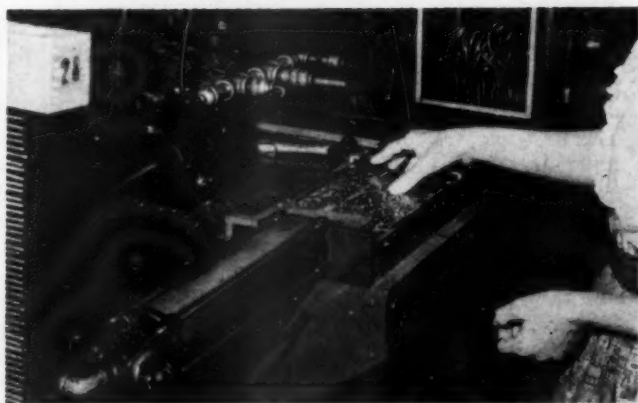
Right: Large-size resistors come from the vendor with one terminal plugged into strips of corrugated board. With aid of spring clamp, feeder can easily load uniform stacks of resistors into hoppers as fast as necessary.



Left: Spools of 2500 small-size resistors are held together and fed from reel into hoppers by tape which is peeled and rewound on small reels.



Right: Beyond the last station, reciprocating conveyor kicks boards off nylon track and into receiving bins for transfer to the next assembly line.



Left: Inspector checks board with 10 jumper wires and 18 resistors in place before loading into next transfer line for assembly of 28 more resistors.

Above: Stations 57 and 58 are in one automatic machine which hopper-feeds 30 terminal and test pins into position through plastic tubes.

Economies of high rate production and elimination of rejects at end of the line are one of the results of precision automation at Admiral.



Shown here are both sides of printed circuit board following press-staking operation at end of transfer line shown in photo at the right.

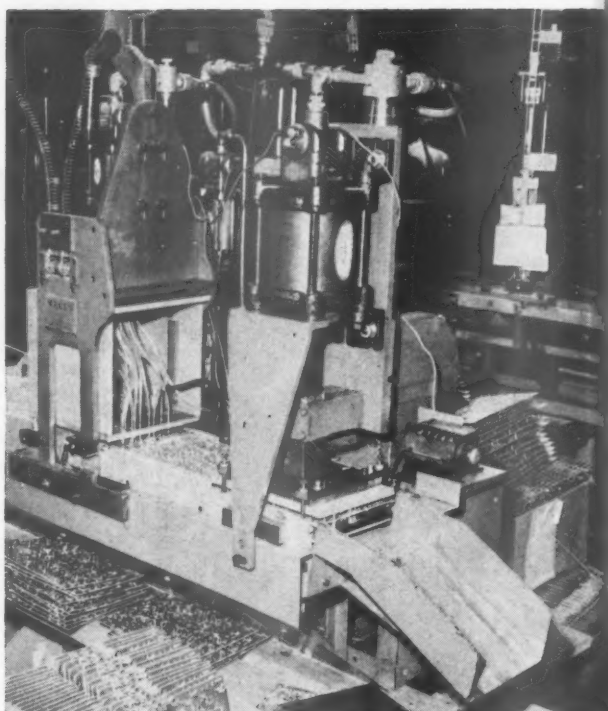
invites more efficiency and orderliness in the servicing of such a set—is the basic reason why Admiral can build a more efficient and more economical chassis within the walls of a smaller cabinet.

Printed circuitry is not only here to stay, but it has been doing a real job for Admiral for over five years. Economies of high rate production and elimination of rejects at the end of the line are results of precision automation. More than half the components in a circuit are assembled by fully automatic machines which immediately notify the attendant if errors occur along the line.

There are a number of lines of automatic assembly machines at Admiral, but for illustrating their basic principles, a single 6" x 8" circuit board was followed through on its straight line trip to the final inspection test bench. Operations along the line are broken down into three major groups to simplify inspection. The first two are fully automatic while the third is manual.

The board chosen for reference combines the assembly of four primary circuits in a typical tv set: the intermediate frequency amplifier, the quadrature sound board (4.5 megacycles), the video amplifier, and the automatic gain control. Assembly grouping is broken down into comprehensible number of parts, not circuits.

The first grouping is comprised of 10 jumper wires and 18 small resistors. All are hopper fed from machines which cut off the terminal wires, bend them down, insert them through punched holes in the circuit board, and clinch the wires below, all in one automatic cycle. The second grouping of parts con-



After terminal pins are positioned, circuit boards move to a pneumatic press-ram which stakes them in permanent position before ejection into bin.

sists of both small and large resistors, another total of 28 components applied in the same manner. The automated line breaks at the end of each of these two transfer lines for inspection.

Immediately after the second inspection, there is a separate machine which drops 30 terminal and test pins in place by automatic hopper feeding, then stakes them by the single stroke of a press ram before ejection. Beyond this machine, another inspection is made and additional parts are inserted by hand along a belt conveyor on the manual line. This is considered the third grouping of assembly operations.

FEW REJECTS FROM AUTOMATED LINES

While automation has been working here for about five years, it is still remarkable that rejects are held as low as Admiral engineers report. The total maximum rejects from the entire assembly line, including rejects from defective vendor parts, tubes, faulty assembly, errors in dip soldering, and any other sources, amount to no more than 10%. Rejects from automated groups of parts are held to less than 1%!

The automated sections of the assembly line are essentially integrated transfer machines with hopper-fed assembly heads operating simultaneously at each of the 28 stations. A reciprocating bar, the full length of the machine, is equipped with clamping and locating pins spaced to center distance between work stations. The pins each engage a hole on one side of the printed circuit boards and slide them from station to station, after each operation, along a nylon track. The reciprocating bar drops down, engages the pins

in boards, moves all to the next station, holds, lifts to release the boards momentarily, returns and drops again. This system is duplicated in each of the 28-station machines.

Controls automatically shut down the whole machine if a part should jam or if a part is missing on the down stroke at any station. When this happens, a red signal glows at the defective station until a "feeder" (machine attendant) corrects the trouble and throws a switch to actuate the master relay control. This is why so few defects can get through. And, even if they should get through that particular line, they would be caught by inspection of that group of parts.

AUTOMATIC CLINCHING OF PIGTAILS

Only two feeders and one maintenance man are required for each two transfer machines. This has been essentially the same for the five years these operations have been functioning, with minor improvements in certain details. One such improvement, not included in the original design of the assembly machines, is the clinching device which

turns over the wire pigtails under the bottom of the circuit board after the driver head puts components in place. The clinchers are air-operated jaws which spread apart to bend the wires outward while under pressure of the driver head on top. The jaws are electrically connected with the relay system. If a connection is not made, because of missing part or misplaced part, the signal information causes the master relay to shut down the machine.

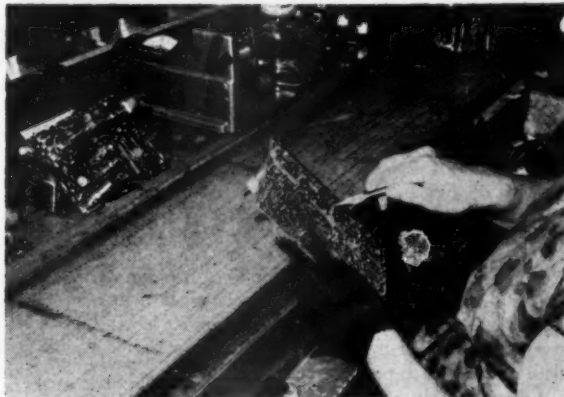
In the beginning, parts were merely hopper fed into place without clinching the ends of the terminal wires. This proved impractical, however, because parts would fall off the boards upon ejection at the end of the line or while they were being handled manually at later stations.

With the line set up as it is now, no imperfect boards can reach the end of an assembly because any imperfect functioning stops the machine and signals the operator. The only errors to slip through on either of the 28-station machines will be defective parts which, of course, cannot be detected until they

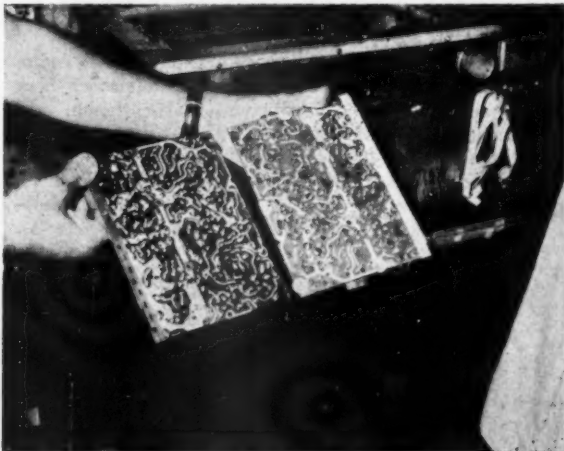
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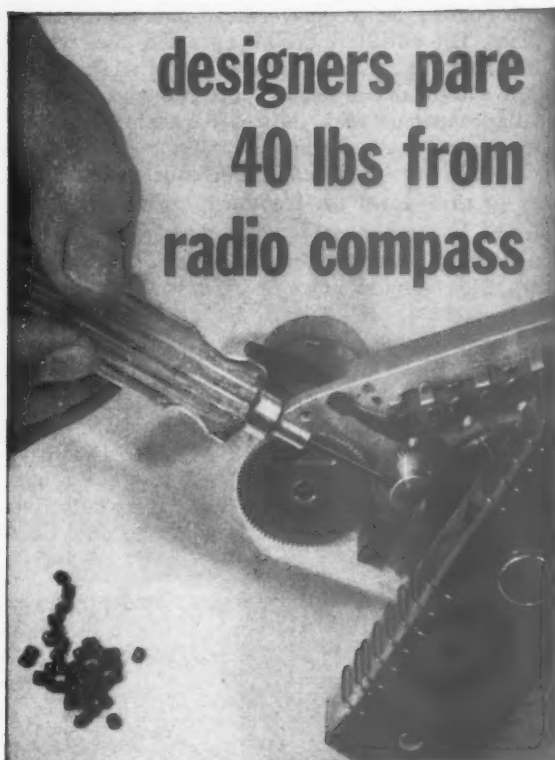
Large components are assembled to board by hand along belt conveyor. A few parts are staked with air-operated tools, with clinching done further along the line.



Dressing and inspection is job of this worker who checks for correct parts, re-clinches lugs if necessary, and aligns parts to stand in uniform position on the board. Side-cutters are used because they grip as well as pliers and can also be used for trimming when necessary.



Board at right is taped to resist solder over mounting faces. Board at left shows clean job of dip soldering which bonds only to terminals.



...but stick to Bristol socket screws

Engineers at Aircraft Radio Corporation, Boonton, N. J., have done an outstanding job of miniaturization in their new ARC Type 21 Automatic Direction Finder—reducing bulk 60% and weight to only 19.1 lbs—as against 60-100 lbs for older models, with no sacrifice in performance.

Like many other ARC navigation and communication aids for aircraft, the new direction finder uses Bristol Multiple-Spline socket set screws in many places such as the antenna shown above during assembly. ARC engineers particularly like these Multiple-Spline features:

1. Production simplification—ARC experience has shown that the wrenches grip more uniformly and securely with the Multiple-Spline screws. Assembly is faster and easier.

2. Performance reliability—a vital factor in ARC's equipment. Bristol Multiple-Spline set screws hold fast under shock and vibration because they can be wrenched up tighter.

Bristol socket screws—most complete line on the market, industry standard hex, as well as Multiple-Spline sockets—are sold by leading industrial distributors. See your distributor. He can frequently give you valuable help on your particular problems and save you time on deliveries from his complete stocks.

A.B.2

Precision socket screw manufacturers since 1913

Made in sizes as small as No. 0 in Alloy Steel and Stainless Steel. Cap screws up to 1½" diam.

THE BRISTOL COMPANY Socket Screw Division
Waterbury 20, Conn.

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Assembly of Printed Circuit Board, continued

are checked out with meters and oscilloscope at final inspection.

Admiral engineers have not attempted to automate the assembly of the larger components because hopper feeding of such parts as different sizes and types of capacitors, tubes, sockets, coils and shields would become unwieldy. Assembly machines would have to be built special for each type of component. Size alone, for some parts, would rule out methods used for resistors. And, adjustment of machines would likely be tedious, resulting in more costly operations than manual assembly of certain parts. Although further automation is a future consideration, for the time being, it is more economical to automate only wire connections and resistors, leaving other parts to manual dexterity.

ASSEMBLE MANY PARTS AUTOMATICALLY

This is not as much of a compromise as it might seem. Jumper wires, resistors and terminal pins, all of which are automatically assembled, comprise over 70% of the total number of parts in the circuit under discussion. This is more or less true of most any electronic circuitry, and the principle employed at Admiral could be applied in many cases where it is now overlooked. For a single tube and coil combination in a given circuit, as an example, there may be upwards of five or six resistors, a dozen jumper wires and as many or more terminals pins. Therefore, it is evident that relieving this proportion of hand assembly, especially on smaller parts, results in extraordinary economies and speed of production.

The printed circuit boards we examined at Admiral were of brown, translucent formica, fully coated with 0.0015" copper, and punched by the vendor to Admiral's specifications. (At their plant in Harvard, Illinois, these boards are silk screen printed, etched, then siliconized by a second silk screen printing to resist solder in unwanted areas.) The punched holes are made 0.010" oversize for the pigtailed of ½ watt resistors, 0.025" for jumper wires, and 0.027" for 2 watt resistors.

SIDE CUTTERS AID HAND ASSEMBLY

Beyond the automated sections of the assembly line, sockets, capacitors, I.F. coils and shield cans are inserted and clinched by hand. Small side cutters are used for this because the blades provide a quicker and more reliable grip on locking lugs than small nose pliers.

With all parts in place, the 200-odd connections are soldered by dipping for only a few seconds. It should be remembered, however, that no imperfect assemblies would pass this point because of the frequent inspections ahead of soldering. The only rejects that can exist after dip soldering would occur from defective components or improper soldering.

Common rejects from soldering consist of solder splash, cold joints, or piling. Good soldering tech-

nique calls for approximately 5 seconds dipping into a pot of 60-40 solder held at 580°F regulated temperature, then shaking off surplus metal. Time varies slightly with different printed circuits because of the differential in heat absorption by different components. Solder splash, caused by tilting the board while the solder is beginning to cool, may result in bridged connections where connections are not to be made. Cold joints come from insufficient plunge or length of time in the solder. Some lugs or terminals may not be heated enough to make them tin. Piling up may occur if the operator does not adequately shake off the surplus solder when she removes the board from the dip. All these human element factors introduced at this one point of assembly could become serious problems, but actually account for only 2% to 4% of total rejects once the operator has had special on-the-job training for no more than 2 to 3 days at the most.

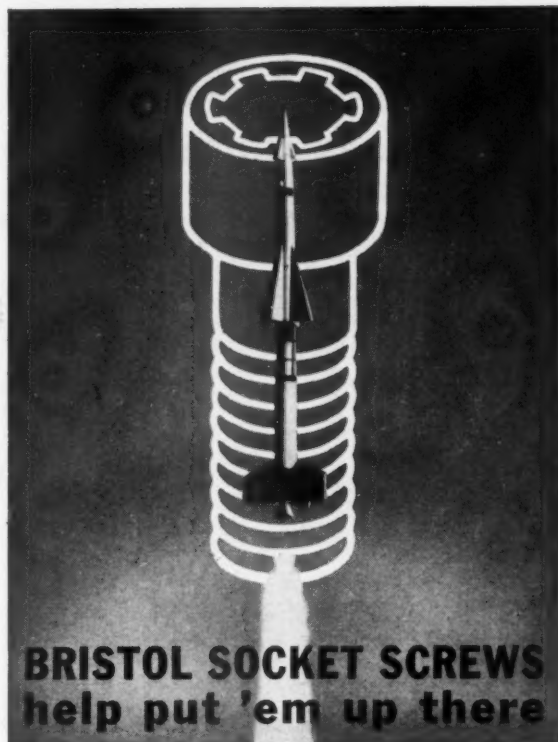
Admiral has realized considerable economy of solder in the use of siliconized resist in all areas except at a terminal itself. If even a thin tinning coat were permitted in the unetched areas of copper connections, it is estimated that from 200% to 500% more solder would be going to waste instead of going into necessary terminal bonds. This saving is far greater than the small cost of silk screen printing of resist on printed circuit boards as a routine step in production.

TOUCH-UP WITH HAND SOLDERING IRONS

Of course, any dip soldering operation can occasionally result in a few spots which may partially resist solder where solder belongs. This can happen because of oils or perspiration left by fingers after too much handling, insufficient fluxing, or for other reasons peculiar to a single component. If and when skips do occur, they are easily touched up with small hand soldering irons along the line beyond the dip. This is more feasible than redipping and damaging boards or parts. The specific error is singled out by inspection and corrected without affecting other connections. It also avoids tying up the dip operation for recycling.

After soldering, each board goes along a belt conveyor to the station where inspection under operating conditions, and tracking or electronic alignment completes the unit. Units are packed in crates for shipment to the Harvard plant for final assembly of complete tv sets.

Operating at the normal capacity of 1,000 boards per 8-hour day from each line, average production of different circuits will run for one to three months on the same setup. The versatility of the automated lines is such that a complete change over to a new circuit can be made in one day. This is one plant where workers do not have to be laid off for days or weeks during a production shut down on transfer lines for model changes. Printed circuits can be simple, efficient and reliable when they are assembled with know-how like that which we found at Admiral Corporation in Chicago.



Bristol socket screws are going places in the missile age. They're consistently aboard some of our finest missiles such as the Army's NIKE and the Air Force's FALCON.

There are good reasons why missile-men like Bristol screws, too. They like the burr-proof, strip-proof Bristol Multiple-Spline socket. It allows them to wrench screws tighter to withstand vibration, to loosen and tighten screws more times, if needed, than ordinary socket screws. They know, too, that all Bristol socket screws—industry standard hex, as well as Bristol-originated Multiple-Spline—are subjected to rigid, relentless quality control. Every step—from highest quality alloy or stainless steel stock to finished screw is carefully guarded by a system of checks and tests that reduce failure probability to nil.

And they come in all sizes down to the miniature No. 0 in both set and cap.

Whether you're working on a guided missile, or an earthbound product, find out about Bristol socket screws. See your authorized Bristol socket screw distributor. He can help advise you on the right screw for your application, from the most complete line on the market, in both hex and Bristol Multiple-Spline socket, set, cap and many other types. His fast deliveries from complete stocks can help you out of many a tight spot.



A 88

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Bristol's Hex Socket Screws

Bristol's Multiple-Spline Socket Screws

*Made in sizes as small as No. 0 in Alloy Steel and Stainless Steel. Cap screws up to 1½" diam.

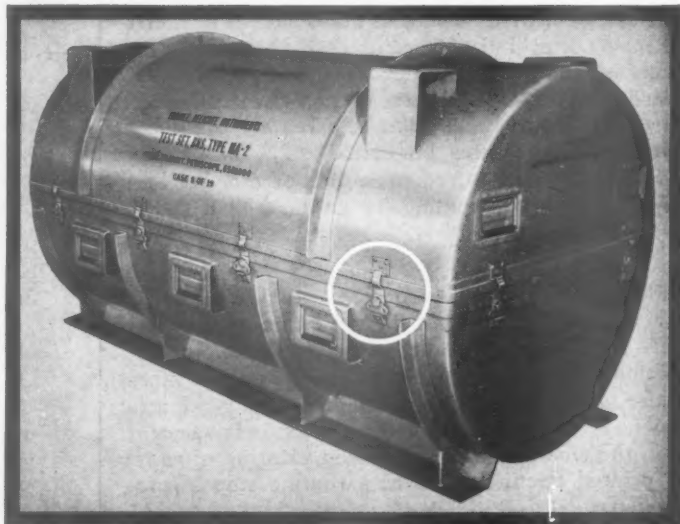
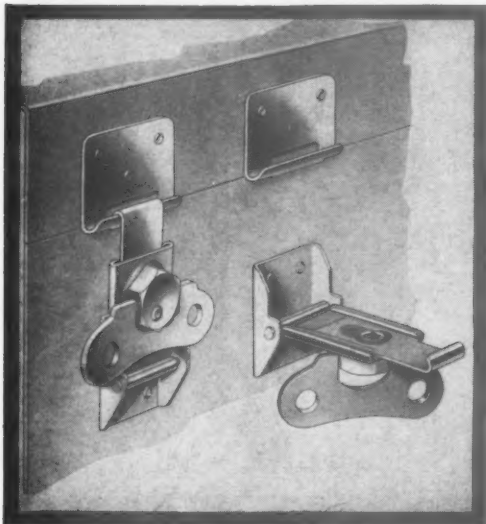
THE BRISTOL COMPANY Socket Screw Division
Waterbury 20, Conn.

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Note—Commercial and Military Packaging Engineers:

Rugged **LINK-LOCK**

...your best answer to exacting closure problems



Photograph courtesy of Craig Systems, Inc.

*LINK-LOCK provides
pressure-tight closure
on this rigidly specified
equipment container*

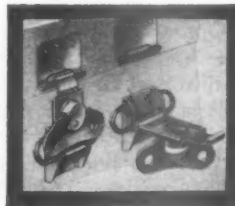
Simmons LINK-LOCK provides quick opening and closing as well as impact-resistant dependability on transit cases manufactured by Craig Systems, Inc., Lawrence, Mass.

The cylindrical Craig container above is gasketed and pressure-tight, and contains delicate electronic equipment. Twelve LINK-LOCK fasteners are used on this model.

Here's why LINK-LOCK is ideal for use on military cases produced to exacting specifications as well as on inexpensive commercial containers:

- Impact and shock resistant (positive-locking).
- High closing pressure with light operating torque.....insures pressure-tight seals where required.
- Available in 3 sizes, for heavy, medium, and light duty.
- Compact design...lies flat against case even when unlocked.
- Opening and closing by wing-nut, screwhead, or hex nut.
- Flexible engagement latch design...can be varied to suit different conditions.

Also available: Spring-Loaded LINK-LOCK. Ideal for the less expensive containers where costs won't permit precision production. Spring provides take-up to compensate for set in gasketing, irregularities of sealing surfaces, and mounting inaccuracies.



Where does the versatile Simmons LINK-LOCK belong in your design? For complete information and specifications, send for the Simmons Catalog today. Samples and engineering service available upon request.

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Sweet's Product Design File

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National Homes benefit from different joining techniques which assure smooth exterior siding

BONDING, RIVETING ALUMINUM SIDING

Manufactured homes comprise a gigantic industry today and are slicing into a huge portion of consumer spending. Last year, 11% of all new starts of single family units were manufactured homes.

National Homes Corporation, of Lafayette, Indiana, has found that aluminum siding is extremely popular for its obvious advantages in many different models ranging from the lowest price bracket to the highest. But, aluminum siding, because it does have such a smooth surface and mechanically perfect configuration in its different patterns, cannot merely be nailed to wall panel sheathing. Nails cannot show because the dimpling of a nail head in the thin sheet, particularly non-uniform dimpling from a hammer, would detract from the appearance of the whole house.

This problem was solved on the assembly line at National's plant by a combination of adhesive bonding and mechanical fasteners. This method makes National's aluminum siding look so much like standard wood siding that it is hard even for a carpenter to tell the difference once it is erected.

Wall panels are fabricated of wood framing and covered on one side with gypsum board and on the other with plywood sheathing. Fiberglass insulation is held inside with adhesive to prevent sagging. All framing members are also coated with adhesive, before wallboard or sheathing is applied, so that the unit structure is somewhat similar to pre-stressed aircraft sections. This makes an ideal foundation for the aluminum siding which can be securely fastened directly to the wall without allowance being required for distortion.

It is this kind of structure which National has found to be necessary not only for quality of product, but for mechanical feasibility when aluminum is applied.

The 3M adhesive, made especially for bonding aluminum to wallboard, is applied to the wall sheathing with multi-nozzle distributors. These distributors are fed from a drum of adhesive equipped with a

continued



Special adhesive, to hold aluminum exterior siding, is spread over plaster board with multi-nozzle guns.



Corrugated siding, pre-cut for window and door openings, is positioned on plaster board foundation.



Caul board is placed between corrugations as panel is rolled to squeeze out surplus adhesive and obtain a positive metal-to-plaster board contact.

Bonding and Riveting House Siding, continued

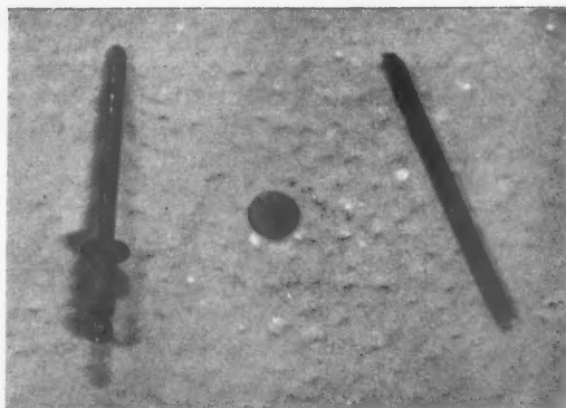
pump which develops 400 psi to the output lines. The adhesive is a syrupy, light-colored material. It lays out in beads as directed by the distributor nozzles.

Aluminum siding is then laid on the panel and moved into exact position. Along one side, which will be at the top of an exterior wall and covered with fascia, the aluminum is nailed. Caul boards are placed between the corrugations of the siding and the whole panel is run through a Black Bros. nip roller. Only the weight of the top cylinder is used for pressing to avoid distortion, slippage, or excess squeeze-out of the adhesive.

This leaves the siding securely fastened to the wall panel. But as an added safeguard for permanent reliability during the years the house is expected to stand against the weather, fastening is specified for the bottom of the sheet aluminum. With nails ruled out because of dimpling and undesirable appearance, other fasteners could be chosen, but each would offer one or more detrimental features such as cost, time for assembly, impairment of appearance, or too noticeable as an individual fastener. National eliminated all these possibilities with Pop rivets.

These blind rivets are supplied in colors to match the pre-finished baked enamel aluminum sheets. They mount almost flush with a very flat head so that no dimpling occurs and the head does not project enough above the wall surface to be noticeable unless one specifically looks for it.

The rivets are simple to install with proper tools. A $\frac{1}{8}$ " hole is drilled through the aluminum and into the wood over flat areas, or through the backing retainer strip of aluminum which interlocks with the corrugations of the siding. The rivet pin is inserted in the chuck of a pneumatic gun. The small end of



Rivet of type used in aircraft industry provides flat exterior surface and a sealed hole after gun has pulled head of pin up into tube and snapped off surplus length.

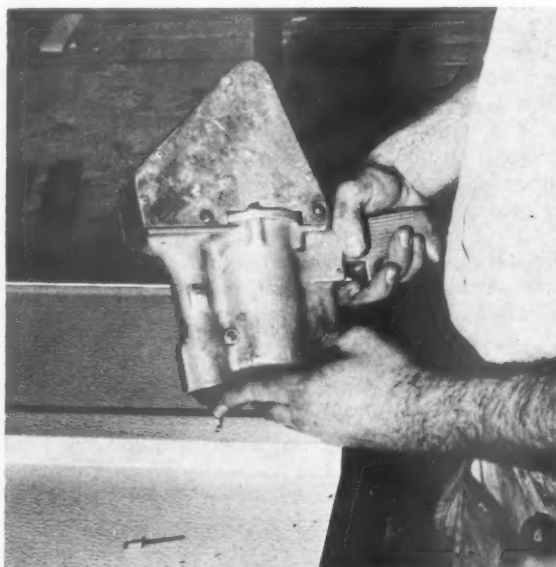
the rivet, which is the head end of the nail-like pin, is pressed into the drilled hole and the gun trigger is squeezed.

Instantly, the gun pulls the pin outwardly until the head expands the tubular shank of the rivet inside the work. When the pulling pressure reaches a pre-determined amount, the pin snaps off leaving the rivet head snugged against the outside surface and the pin head swaged behind. The pin head, being drawn up inside the hollow rivet, seals the hole from moisture or dirt.

National was the first to apply aluminum siding to manufactured homes on assembly lines in the plant. Perhaps this unusual application of assembly line techniques to something more related to the building trades was not as unusual as it seems since some of National's engineers were formerly employed in the aircraft industry where this kind of thing is done every day.



Electric tool drills holes in each flat area (on top of corrugations and in area between) for blind riveting.



After small end of rivet is pressed in hole, action of gun expands tubular shank of rivet inside the work.



299 - H. H. Scott 40 Watt Stereo Amplifier



SECURED AT LOWER ASSEMBLY COSTS

**Thomson Rivets and Rivet-Setting Machines used by
H. H. Scott to standardize fastening procedures.**

Any high fidelity hobbyist will tell you that H. H. Scott, Inc., Maynard, Mass., makes America's top quality in high fidelity equipment.

Here you see one of the finest stereo amplifiers made . . . in both chassis and final form. Components are securely and accurately held in uniform tension by 113 Thomson Rivets. H. H. Scott has standardized on Thomson aluminum rivets in one diameter and four lengths.

Rivets get their uniform clinch from any one of the eight Thomson Automatic-Feed Rivet-Setting Machines which H. H. Scott now uses.

All eight machines have identical tooling except for interchangeable anvils. Several sets of numbered, color-coded anvils cover all variations in assembly thickness. Change-over time is a matter of seconds.

E. G. Dyett, Jr., Purchasing Agent of H. H. Scott, reports, "The use of Thomson rivets and rivet-setting machines has produced assembly economies and resulted in lower over-all costs, while improving product appearance and mechanical construction."

Chances are the Thomson Fastening Man can help you improve product quality and reduce your costs. It costs nothing to find out. Make a date with him soon. You'll find him listed in the yellow pages of your phone book. In the meantime, you'll want Thomson's latest catalog. Write today for your free copy to Dept. AS.



Style 161
Thomson Automatic
Rivet-Setting Machine



JUDSON L.

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MFG. CO., WALTHAM 54, MASS.

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how to pick

the one right SOLID PIN for the job

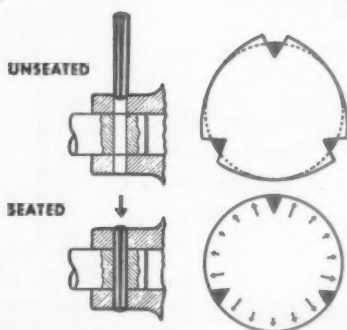
(the solid Groov-Pin is still the safest, surest way to pin two parts together)

The Groov-Pin has the holding power of a press fit pin *without* the need for close tolerances, and the ease of installation of a taper pin *without* the need for reaming.

You just drill the hole and drive the pin home. Once seated it stays there... no matter what the condition of shock or vibration.

Available in low carbon steel or other materials (stainless pins are Type 303, non-magnetic). Diameters from 1/32" to 1/2" are standard; specials are available and priced as standard in lots above 5000.

Write today for samples, comprehensive catalog, and acetate copy of this ad suitable for wall mounting. Groov-Pin Corporation, 1135 Hendricks Causeway, Ridgefield, N. J.



the unique GROOV-PIN locking principle

When a Groov-Pin is driven, the material displaced by the grooves is forced to flow back, setting up a powerful locking force. The ability of Groov-Pin to hold under severe shock and vibration... and its immunity to vibration fatigue... has been thoroughly proved by the billions in use!

GROOV-PIN

fastening gears, pulleys, sprockets, collars and cams to shafts.



type 1

The basic Groov-Pin and most widely used. Has three full length grooves tapering from maximum diameter at one end to nominal diameter at the other.

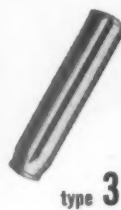
locating pins, stop pins, hinge pins.



type 2

Grooves cover only one half of pin length. Used where holding power is not critical. Speeds assembly because ungrooved portion acts as a pilot.

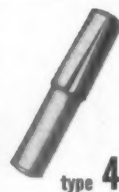
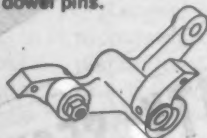
clutch and brake pedals to cross shaft; bike pedal arms to brake shafts.



type 3

Recommended for severe shock and vibration applications, its full length parallel grooves give it great holding power. Type 3H is essentially the same, but has pilots on both ends suiting it for hopper feeds.

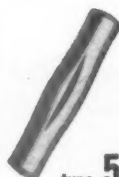
stop pins, locating pins, dowel pins.



type 4

Similar to Type Two, but taper on grooves is reversed, meaning groove end is inserted first. This is particularly good on blind hole applications.

aircraft cowling, cover plates for buses, trucks.



type 5

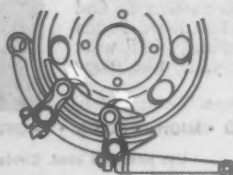
Has three oval grooves half the length of the pin, centrally located. Especially suited for quick removal and replacement. Type Five is also well suited for hinge pin applications.

spring anchors, spring control pins.



type 6

Same as Type Two, but with annular grooves on ungrooved end for spring anchor or retaining ring. Type Six is for through holes; Type Seven for blind holes. In addition, annular grooves may be machined to your specification — for use with retainer rings, for example. See catalog for standards.

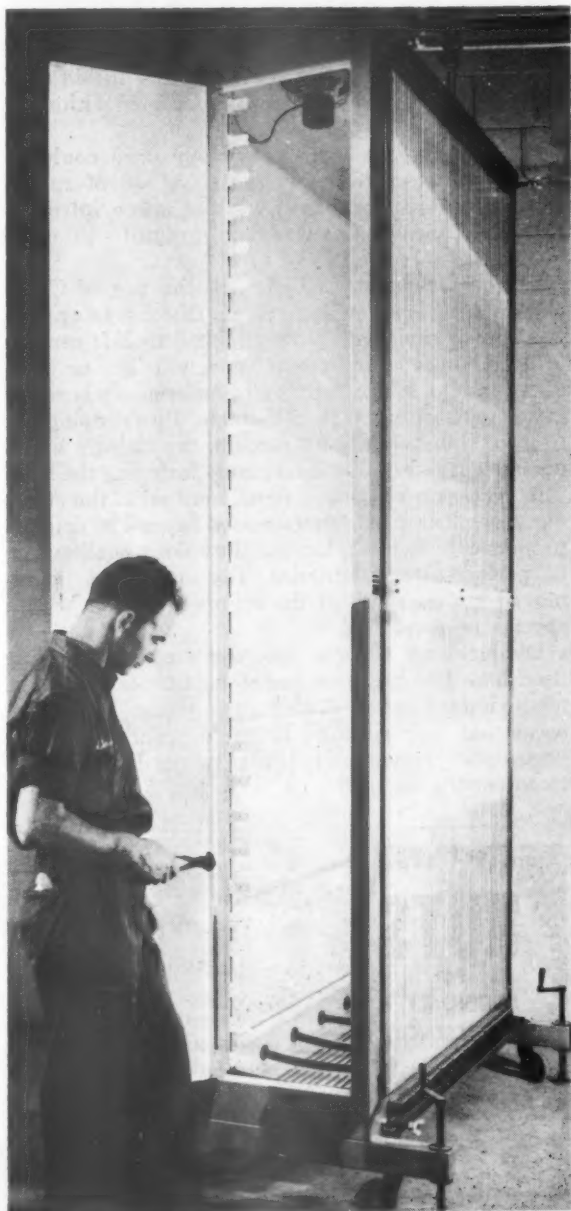


type 7

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ASSEMBLING MANOMETERS FASTER

Use of special clamp permits hose lines to be connected after manometer is assembled inside its cabinet



Panel on manometer, used for force and pressure measurement, opens to permit connecting hose lines.

When the Dynametrics Corporation, of Burlington, Massachusetts, redesigned its MB line of multiple-bank manometers about two years ago, a difficult assembly problem was solved with the aid of a new type of hose clamp.

This was the problem. Earlier models of their manometers were produced in two stages. First, all interior components—fluid reservoirs, manifolds, hose lines and indicator tubes—were pre-assembled. Then the complete interior assembly was installed in a cabinet. This method allowed plenty of working space to connect the fluid hose lines to the other components.

But the newly-designed line could not be assembled this way. To reduce the overall dimensions of each unit and make it more compact, Dynametrics designers had altered the location of the fluid hose lines. Instead of containing the hose lines entirely within the cabinet, cabinet depth was reduced by passing the hose lines down through a base panel at the front of the cabinet, then back up through the

continued



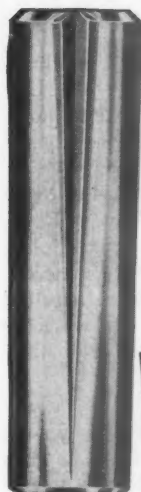
Applied with hand tool, new-type clamps permit connections to be made after unit is almost completely assembled.

now- SHEAR-PROOF

ALLOY STEEL

DRIV-LOK
PINS

for
maximum resistance
to



shear

shock

fatigue

- Drill a hole and drive them in... they're grooved and self-locking
- Provide the ultimate in physical properties at moderate cost
- Re-usable without loss of holding power

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B



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U

COMPARE TYPICAL SHEAR VALUES (Minimum double shear strength in pounds)	Diameter	Slotted Spring Pins	Coiled Spring Pins HEAVY DUTY	SHEAR-PROOF DRIV-LOK PINS
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	1/8	2100	1840	3690
	5/32	3000	2880	5720
	3/16	4400	4140	8240
	1/4	7700	7360	14720
	5/16	11500	11500	22960
	3/8	17600	16580	33160
	7/16	20000	22540	45000
	1/2	25800	29440	58900

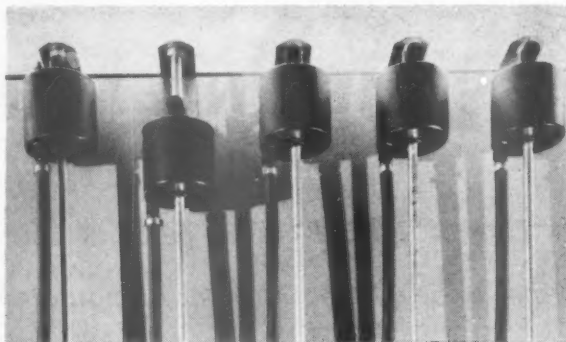
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Clamps Speed Manometer Assembly, continued



Clamps provide leak-free connections. Cost of assembly with these clamps is 24 times less than former method.

base panel at the rear. This design meant that the hose lines had to be connected on the inside after the manometer was completely assembled within the cabinet.

Because the fasteners previously used could be applied satisfactorily only with the aid of special fixtures and with plenty of working space, introduction of the new design was held up until a practical fastener was located.

The problem was solved with the use of Circle clamps. This is a new-type clamp that can be applied in a few seconds with a simple hand tool. It consists of a one-piece round metal band with one or more interruptions in the band's circumference where the metal folds outward in a U-shape. By crimping the neck of this U-fold with pincers, the clamp's inside diameter is reduced, thus securely fastening the hose. This crimping produces a permanent set in the clamp metal because it has been stressed beyond its original proportions. It can't loosen, thus does not have to be periodically retightened. The clamp can be removed by snipping off the crimped fold, or with a special removal tool.

Dynametrics reports that the cost of installing fluid hose line has been reduced 24 times below the method used before. The company also states that occasional leakage is no longer a problem and the permanent connection indicates no need for periodic maintenance.

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Assembly and Fastener Engineering



One of the earliest and most basic breakthroughs in fastener design was the common safety pin. And, although DOT is not a manufacturer of safety pins, many a DOT industrial fastener has had an equally revolutionary effect on modern fastening technique. Hundreds of different DOT fasteners have created relatively minor revolutions in specific industries.

A DOT fastener may save a few man-minutes of labor. It may save material. Or it may improve product performance and hence saleability. But multiply each small improvement by the number of units in a true mass-production operation and the savings really pile up to impressive proportions.

Rather than spend your own design staff's time on fastening problems, it might pay you well to call in DOT. You'll have at your service a design and production organization with large-scale facilities for genuine mass-production of special-purpose fasteners and self-fastening devices of all kinds.

Supplementing the Carr Fastener Company are a number of other plants which form the United-Carr Fastener group. They are located in the principal production centers of the United States, Canada, England and Australia. Your nearest United-Carr Field office (see below) is no further away than a telephone call from your desk.

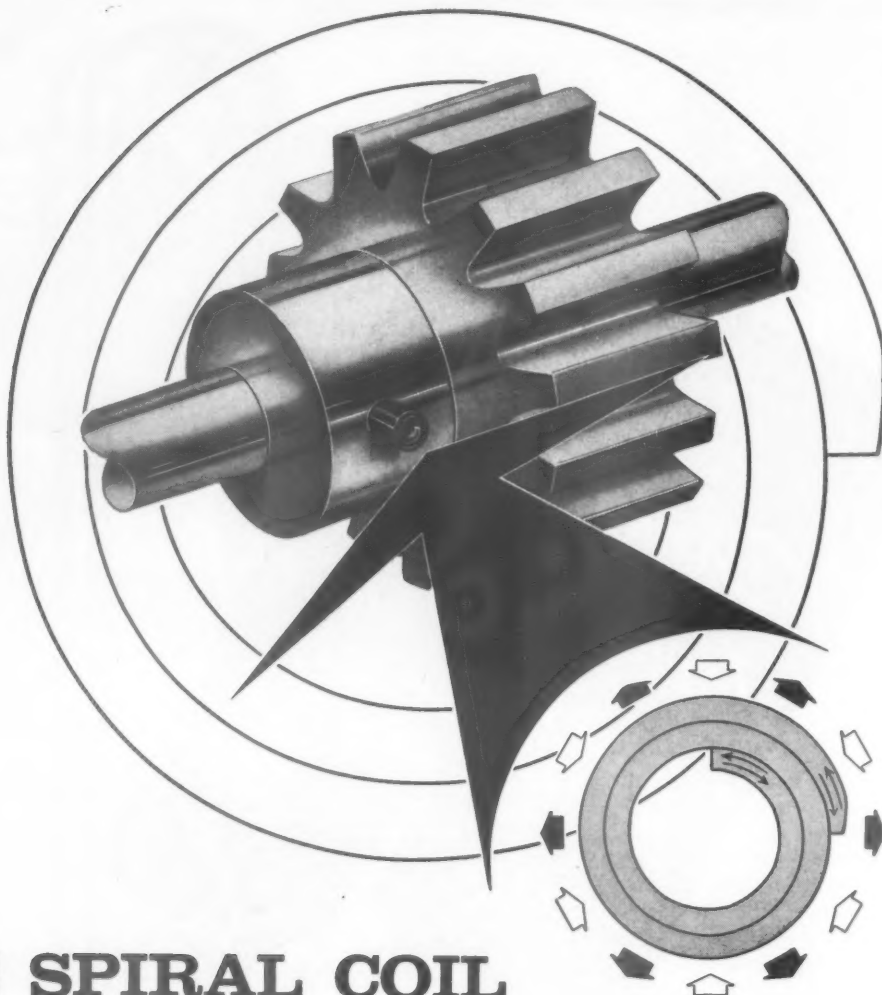


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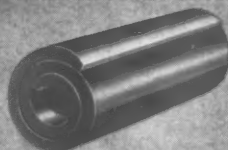
SPIROL PIN is a spirally coiled metal strip that acts like a true spring. When the pin is compressed into a hole, the radial tension is distributed *uniformly* throughout the spiral coils. There is no concentration of stress along a fragile "hinge line". This real coil-spring action permits wider plus-and-minus hole tolerances . . . eliminates precision reaming . . . works successfully with *low-cost* non-heat-treated metals. SPIROL's greater resilience increases shear strength, shock and vibration resistance.

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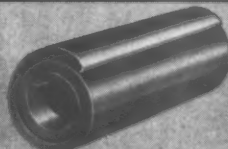
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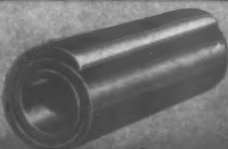
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For applications where shear and shock loads are extremely severe, Spirol pin's spring action withstands high stress.



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ASSEMBLY OF ARTILLERY SHELL

Pioneer engineering in conveying, crimping, pellet-handling and quality control turns out mammoth assembly machines for U.S. Army. Cost? \$800,000

Automating the assembly and inspection of artillery ammunition required original engineering thinking in four principal areas: pellet handling and weighing, conveying, crimping and quality control.

Successful proof tests at the Joliet, Ill., Arsenal indicate that for the first time in munitions history, machinery is available to produce one-third more 75 or 90 mm rounds every eight hours with less than one-third the present manpower. Industry will find most interesting different techniques of assembly developed by the American Machine & Foundry Company's Mechanics Research Division during this standby armament project for the U.S. Army Ordnance Corps. The Chicago center will have spent

4½ years and \$800,000 to complete the job by the end of 1959.

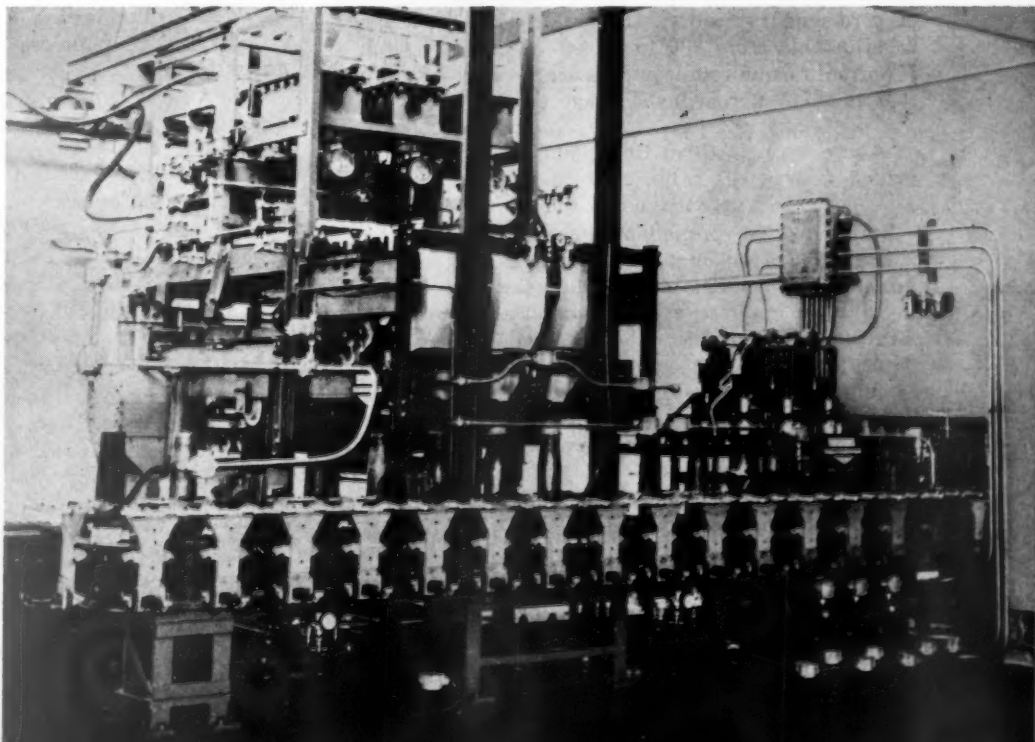
Specifically, the new machine will handle 64 tons of propellant in a four-shift. Propellant will be precision-weighed and dispensed into cartridge cases which are crimped to the projectile, checked and cartoned, at a rate of up to 45 shells per minute. Where 109 workers were once needed, 30 (including 10 technicians) will now do the same job. And according to Edwin W. Johnson, AMF research engineer who spent 10 months making the five key stations operational, a dozen people within the building could keep the setup going in time of emergency.

The line is divided into 12 stations. The first three already completed include the heart of the operation: the weighing of the propellant to an accuracy of one part in 2000, the joining of the shell to the projectile by crimping, and a central control room for the entire line. Equipment for the remaining seven stations, which involve decartoning the components and packaging the completed rounds, is now being fabricated.

The entire system conforms to the strictest of safety regulations providing explosion-proof equip-

continued

Powder weighing station, pre-assembled in three sections with Elastic stop nuts, is designed to fill artillery cases with pellets to accuracy of plus or minus one pellet in required 3800. Six completed stations contain over 15,000 feet of wiring and 2000 feet of copper tubing.



Assembly of Artillery Shell, continued

ment for all electrical parts in dangerous areas. This embraces some 15,000 feet of wiring.

The "fail-safe" design is such that should any electrical component fail, the machine will stop automatically. If an inspection circuit indicates three consecutive rejects at any check point, the line will stop.

From the time a case is fed to the beginning of the line at Conveyor 1 until the complete round comes out of the taping and stencilling machine at end of the line, three minutes have elapsed.

The Research Division's Automation Section, directed by R. E. Miller, designed and constructed its own conveying system. The finished main conveyor is 33 feet long, indexes three feet a second and requires only 10 indexes and 40 seconds to convey each case through the five work stations. The drive unit was designed with uniform acceleration and deceleration to reduce the forces encountered in conveyor operation.

The main conveyor is powered by a 10-hp motor. The path of the drive power is from the motor through Gates V-belts, the clutch brake unit, a Michigan Tool cone drive reduction (15-1 ratio), and the differential drive unit to the conveyor sprocket.

The conveyor's Link-Belt chain was selectively assembled for lengths of three feet, plus or minus .005". Conveyor fixtures are spaced every 12" and their index position varies only because of chain tolerances. The drive unit causes the conveyor to index precisely 36".

Fixtures, attached to the chain, are made of cast aluminum and cast iron. Automatically spring-locked "butterfly" clamps hold the cases in the fixtures. The specially designed aluminum clamps are air-cylinder controlled and utilize Teflon grips.

Another time-saving mechanism is the conveyor's throw-clutch, which has quick release action and easy re-synchronization. The clutch point of release is adjustable from 200 to 12,000 in.-lbs. of torque. If normal torque requirements are exceeded for any reason, the clutch will disengage the sprocket from the drive shaft. To reset the clutch, the chain is advanced with fixtures to a point where a spring-loaded roller will drop back into a shaped slot. This slot is in a cam driven by the main drive shaft.

Station 3, the propellant weighing station, is a masterpiece of ingenuity. It contains design features quite possibly adaptable to other precision weighing and fill applications. Any material, from which uniform-size items can be separated for the deficiency add, is readily adaptable to this system. The system can be altered or modified to weigh almost any solid material which will flow or can be conveyed, provided the weight of a piece of the material is less than the tolerance.

Bulk powder is first brought from a distant storage area to the main building's third floor through a protected passageway on a standard Inland mono-rail. A man at each of three positions dumps 110 or

150 lbs. of pellets—9/32" in diameter and 5/8" long—into supply hoppers. These feed "volume fill" tubes are part of the first stage of the two-stage weighing system. In this stage, a fixed volume of propellant that is deliberately gaged to be less than the final weight, is measured in special containers. Part of each container is a flask that has the proper volume and is built with an inverted funnel-shaped top and a dump gate at the bottom. The tube at the top of this flask is arranged so that it is below the level of the propellant during filling. After each index of the propellant weighing conveyor, the flask is lifted, thereby raising the tube above the level of the propellant. The dump gate at the bottom of the flask is opened and the propellant is dumped into a tare-weight pan beneath. This pan is mounted on the weighing conveyor which places the pan in position on a beam balance. A differential transformer senses the deflection of the balance. This transformer output actuates a position servo which in turn positions a rotary selector air valve.

To serve the second stage (deficiency-add) of the weighing system, pellets are diverted from the center bulk propellant supply tube onto three sorting platforms. Standard-size pellets are returned to the center volume fill unit. A Cleveland air vibrator moves the pellets across the sorting platforms in single files. The pellets are directed across a series of openings of such sizes that short pellets are removed first, then extra-length or double (twin) pellets; standard pellets continue to the volume fill unit. The standard pellets are fed into a column machined from aluminum and plastic. The column is piano-hinged for quick inspection and accommodates 75 pellets end-to-end.

The second stage is designed to select the exact number of make-up pellets from this column. The position assumed by the rotary selector air valve is calibrated to correspond with the number of pellets that are necessary to bring the initial volume weight up to the proper value. This information is transmitted pneumatically to one of the air cylinders positioned on the housing of the column and located on pellet length centers. This activated cylinder holds all pellets above that point while a gate at the bottom of the column is opened to allow the pellets below that point to be added to the weight to complete the batching operation. This weighing system is capable of accurately weighing propellant charges to a tolerance of plus or minus one pellet of a total charge of 3800 pellets.

An elementary, yet most effective, memory device was designed by research engineer George Welsh to store and release at the proper time the results of the check-weigh operation. The pellet-filled pan is moved onto a check scale which transmits through a servo system to a solenoid when a round is acceptable. There is nothing recorded if the weight is inaccurate and the case is automatically pulled off the conveyor at Station 4. This guards against defects or mechanical failures of any kind. Rounds within tolerance cause the solenoid plunger to move a rod to the "accept" position. This pushes the rod in, where—five indexes later—it will avoid

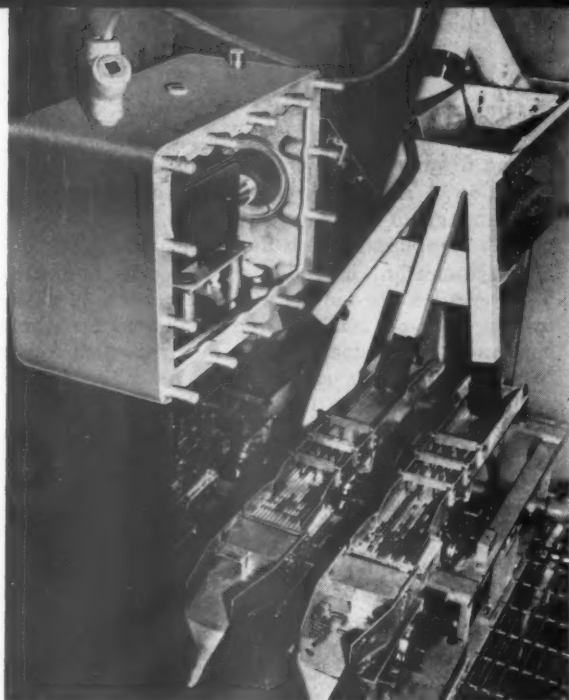
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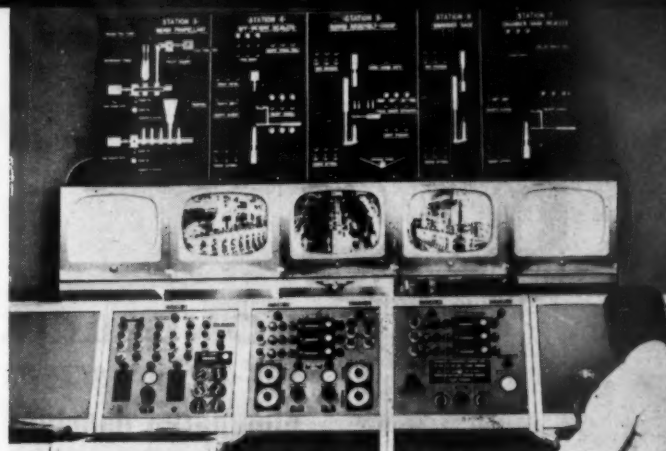
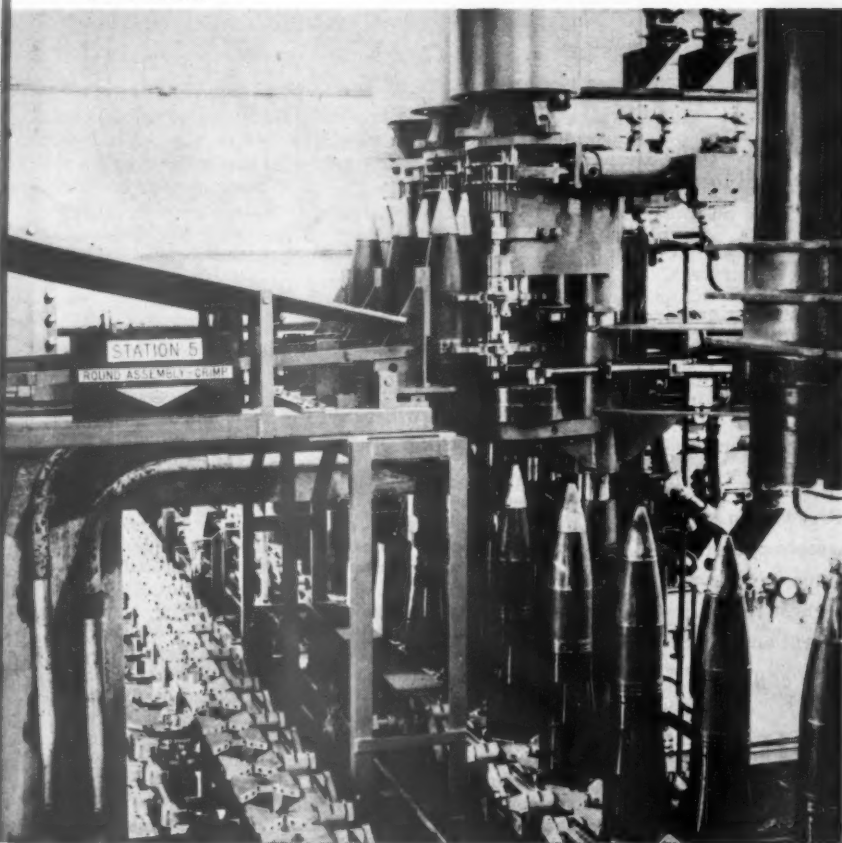
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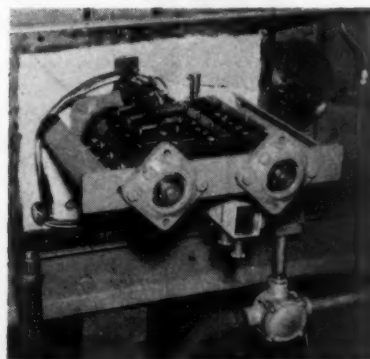


Non-standard pellets are weeded out on this shaker table. A TV camera, housed in explosion-proof box (opened for this photo), checks operations through a mirror. Note the Ladish tri-clover quick disconnect couplings on the pellet tube.

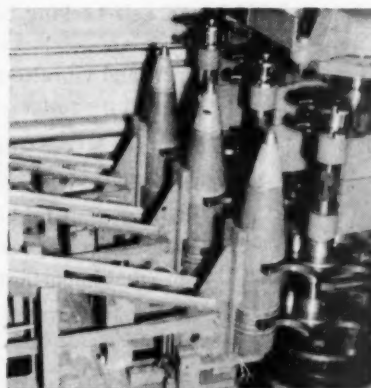
Shells are fed from one conveyor, cases from another to meet in a crimping die where three sets of eight radial jaws crimp the case necks into circular grooves on the shells.



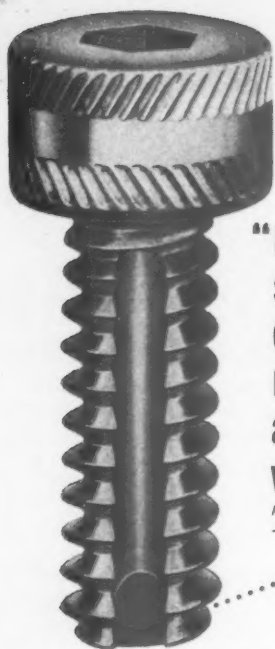
One technician can control the line's entire operation while viewing all critical phases of assembly. This system has proven its worth in tracking down trouble spots.



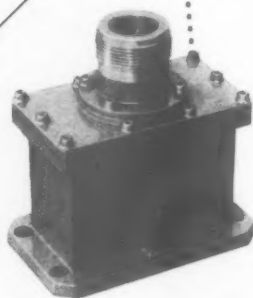
Rube Goldberg-like memory device records the weight of each pan of powder. Through a servo system unacceptable rounds are pulled off the line automatically.



A crimping die head which "floats" has eliminated one assembly problem. It can seek out the shell's crimping groove, which is hidden from view once the shell is inserted into the case.



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Assembly of Artillery Shell, continued

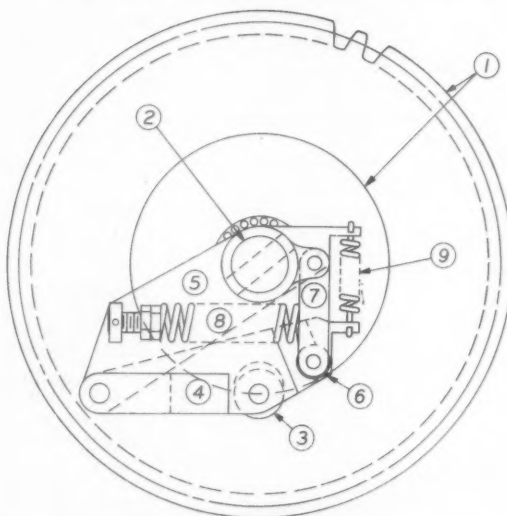
hitting a switch, allowing it to pass inspection.

Station 4 also halts the accepted, loaded cases long enough to spray a .015" thick band of sealing (NRC) compound inside the neck of the case.

The important crimping step focuses at Station 5. Projectiles are fed from a side conveyor, passed over a marking machine and positioned upright in sprockets. Three loaded cases are raised by elevators from the main conveyor and locked in position with the open necks inside the dies. The sprockets index shells into position where an air cylinder supplies the 5000 lbs. of force required to push the shell down into the case, seating with an audible "pop," after which jaws operated by a radial cam put in eight stab crimps around the case necks in grooves.

The entire line is monitored in the central control room. In addition to counters which keep track of components processed at each station, five closed-circuit television screens provide continuous visual contact with critical points.

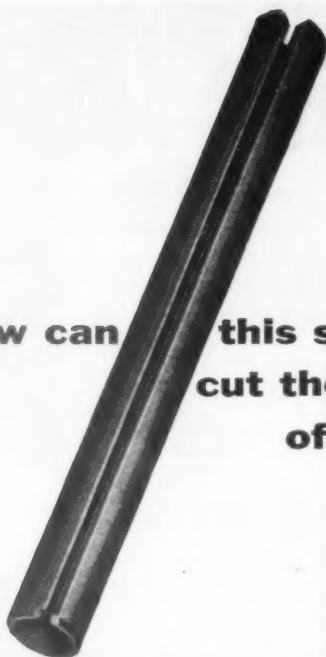
Indexing Torque Release Clutch



This is a clutch composed of an integral driven (or drive) member and cam (1) bearing to the drive (or driven) shaft (2), connected rotationally by a mechanism which will release the connection between the shaft and member at a pre-determined torque in either rotational direction. The mechanism will also re-engage the connection when the exact angular position of release is again obtained. The release mechanism consists of a cam follower (3) attached to an arm (4) pivoted on a bracket (5). The bracket (5) is rotationally fixed to the shaft (2). The cam follower (3) engages a recess in the cam (1) which completes the rotational connection between cam (1) and drive shaft (2). Transmission of torque through cam (1) and drive shaft (2) produces an outward radial force on cam follower (3) which is restrained by roller (6) engaged in a cam surface on arm (4). The roller (6) is attached to lever (7) which is pinned to bracket (5). An adjustable compression spring (8) holds roller (6) in engagement with arm (4). Slopes of the recess in cam (1) and cam surface in arm (4) plus the compression force of spring (8) determines the torque of release. When release torque is reached, roller (6) through lever (7) depresses spring (8) and allows arm (4) to rotate outward, disengaging cam follower (3) from cam (1). This permits cam and driven member (1) to rotate freely on its bearings.

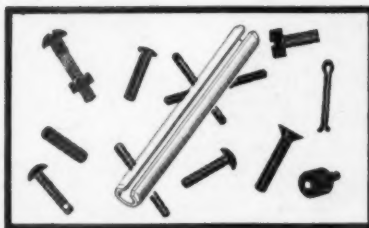
Assembly and Fastener Engineering

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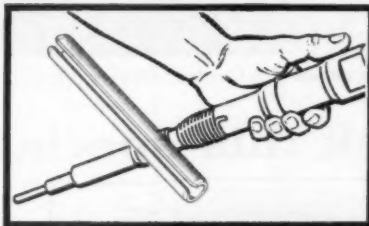
Rollpin aids standardization and reduces inventory

Rollpin readily replaces taper pins, grooved pins, straight pins and set screws; it can be used as a locating dowel, hinge pin, cotter pin, stop pin or, in some applications, even as a rivet. Thus, when you standardize on a Rollpin you can drastically reduce the variety of fasteners in your inventory—save money in purchasing, storage space and stock handling.



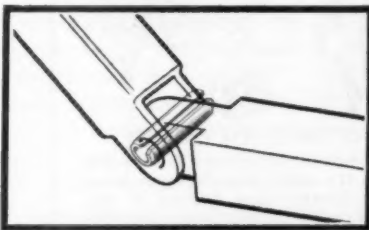
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Assembly and Fastener Engineering

VERSATILITY WITH DIE-CAST FASTENERS

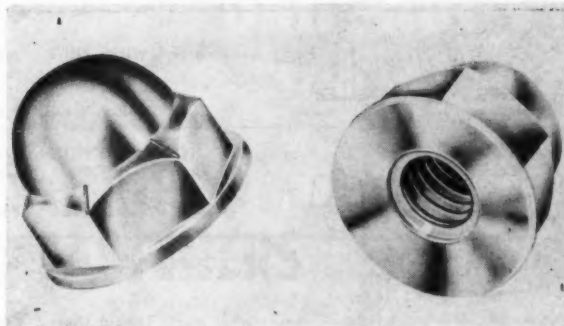
Zinc fasteners in complex design permit combining in one part the functions of multiple components

by **Carl Chase**, Industrial Engineer, Gries Reproducer Corp.

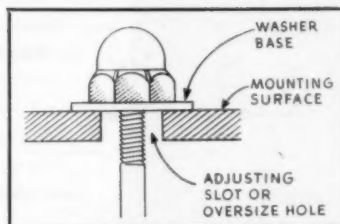
In an era of Mach numbers, engineering breakthroughs, and technical miracles, it is easy to overlook the advantages and economies of so commonplace an engineering material as zinc. The favorable properties of this material are being put to work every day in an extremely wide variety of die cast fastenings which, though they cannot compete with moon rockets, are real technical advances offering designers a chance to improve everyday products like appliances, furniture, electronic equipment, and the like—and often they offer attractive cost savings.

The most important single characteristic of the method of die casting zinc fasteners is that intricacy of shape can be achieved without material waste or secondary operations. This characteristic has allowed fastener engineers to design their products virtually without regard for the problems of fabrication. Thus the engineer can design for the job rather than for the production process. Not only is die casting used to produce fasteners and other products which are economically impractical by other methods, it is also being used to create fasteners which combine in one part the functions of two or more parts. Since die casting equipment is impartial to the shape of the part produced (within the range of possible shapes, of course) complex configurations can be made at low costs.

Where secondary operations are required, another



These washer base cap nuts illustrate ability of die-casting process to produce unusual fastener designs. As shown in drawing, wide washer provides grip to allow for oversized or offset holes, or for the use of fastener with an adjusting slot.



of zinc's properties recommends it. The metal is extremely workable. Threading or other machining, if needed, is readily accomplished so that cost cannot get out of hand.

In terms of physical properties, zinc is adequate for all but the most demanding applications. In fact, it has several advantages over other common and exotic materials of construction. For one thing, it is the only common metal for fasteners which will not "freeze" after it has been left in place for protracted periods. As die cast, its natural surface is smooth and ready for use without secondary finishing operations. It can also be plated or painted to match other parts of the assembly without extensive prefinishing. But in the vast majority of applications it needs no surface coating of any kind since zinc is corrosion resistant under normal conditions.

The ultimate tensile strength of Zamak 3, the alloy most used for zinc die cast fasteners, is 41,000 psi.

continued

Versatility with Die-Cast Fasteners, continued

Compressive and shearing strengths also compare well with those of materials commonly used.

A wing nut may be the indicated fastener for a particular assembly, for example, but due to the fastener location—let us say in a recess—no standard wing nut is suitable. Before time and money are spent in designing a wing nut that will work, and more time and money spent in procuring it, a search of the available designs can yield rewarding results. In an actual case parallel to this example, the manufacturer of a portable electric saw used a "high wing nut" (available from inventory). It is no coincidence that other manufacturers of diverse products are using the same wing nut.

Another example of the same solution to "special" fastener problems is evidenced by the "low wing

nut" developed to hold paint rollers to their support brackets. Originally conceived as an easily removable fastener taking minimum head room (so that the edge of the roller could be brought right up to the corner between two walls), it finds use in a number of situations where head room is at a premium. It requires a little more than $\frac{1}{4}$ inch of height, for example, to provide a secure grip on a No. 10-24.

All of the fasteners shown in the accompanying table are available from stock.

Of course, nobody likes to use a fastener of special design when some standard design or stock part can be used with an attendant cost saving. Whenever a non-standard design is indicated, the designer is well advised to look into the scores of "special" fasteners currently in production or stocked by precision small-parts die casters.

The same characteristics which make the die casting process so attractive as a means of producing

Shown here are representative zinc fasteners made by die-casting. The sizes may vary slightly with the different

manufacturers, though the basic sizes mentioned here are typical of fasteners made by the author's company.

	SENIOR WING NUT:	Made to standard dimensions. Seven basic sizes from wingspread of 0.650 to 1 $\frac{1}{8}$ inch, in 19 thread sizes from No. 4-36 to $\frac{1}{2}$ "-13.
Typical Uses:	Fans, steel chairs, hack saw frames.	
	LOW WING NUT:	Five basic sizes from a height of 0.240 to 0.562 inch, in nine thread sizes from No. 5-40 to $\frac{3}{8}$ "-16.
Typical Uses:	For use where top clearance is limited, such as paint roller attachments.	
	CAPPED WING NUT:	Basic size is $\frac{31}{64}$ high and available in five thread sizes from No. 10-24 to $\frac{5}{16}$ "-18.
Typical Uses:	For protecting bolt or to prevent snagging on such products as crutches, portable displays, and garden furniture.	
	WASHER BASE WING NUT:	Four basic sizes have maximum washer diameter from $\frac{1}{2}$ to $\frac{7}{8}$ ", in 11 thread sizes from No. 6-32 to $\frac{3}{8}$ "-24.
Typical Uses:	With soft surfaces, oversized or offset holes, adjustment slots—on such products as displays, drawing tables, air-conditioner dampers.	
	CLOSED END CAP NUT:	Eight basic sizes from $\frac{1}{4}$ to $\frac{15}{16}$ inch hex, in 20 thread sizes from No. 4-36 to $\frac{3}{8}$ "-18.
Typical Uses:	For enclosing bolt end for safety or appearance, such as for fractional hp motors and steel partitions.	
	OPEN END THUMB NUT:	Six basic sizes from $\frac{1}{2}$ to $1\frac{1}{8}$ inch head diameter, in 19 thread sizes from No. 4-40 to $\frac{7}{16}$ "-20.
Typical Uses:	Adjustable razor blade holder. (Similar to closed end thumb nut, but can accommodate longer bolts.)	
	ONE-PIECE THUMB SCREW:	Six basic sizes from $\frac{1}{2}$ to $1\frac{1}{8}$ inch head diameter. Screw length to $\frac{3}{4}$ inch in nine threads from No. 5-40 to $\frac{7}{16}$ "-14. (Round fluted head is integral with screw.)
Typical Uses:	Camera equipment, clothes drying racks.	
	TWO-PIECE WING SCREW:	Five basic sizes with length to 4 inches, and with nine thread sizes from No. 6-32 to $\frac{1}{2}$ "-13.
Typical Uses:	Clamps.	

these standard fasteners also recommend it where some unusual shape is required.

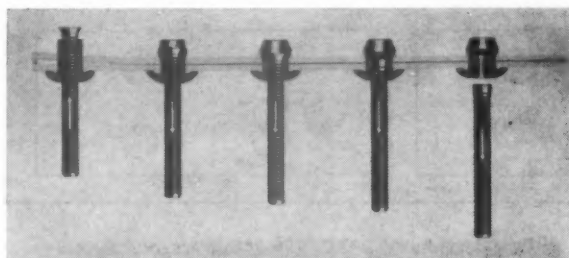
But before departing the familiar ground of fasteners available from stock the designer should make sure that (a) no available fastener can fill his need, and (b) no standard fastener can be adapted to his need. Often this latter process can be used to effect sizeable savings without any compromise of engineering design. It is not a simple matter of using the "wrong" fastener for a job—or even one which is "almost right." By means of interchangeable die elements, the die caster can often combine features of existing fasteners or add new features to existing fasteners.

Extension bosses, necks, lugs, and other features can usually be added to a fastener for which dies exist at a fraction of the cost of tooling up to make a brand new type of fastener. •

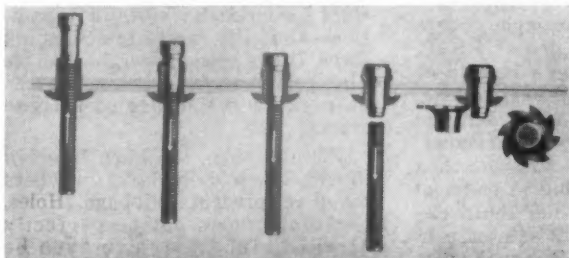
CORRECTION: IN JULY REFERENCE FILE

In the article, "Blind Rivets Permit One-Man Assembly," in July, the captions on page 49 were mis-matched with the photos. The same photos with correct captions are presented below.

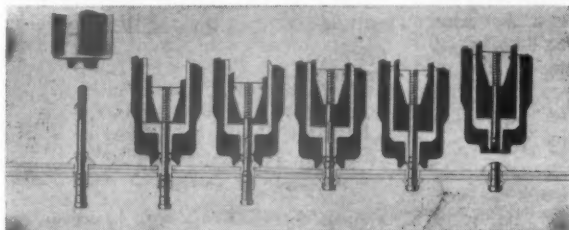
The editors apologize to Mr. H. G. Brilmyer, the author, to the Huck Manufacturing Company, and to our readers for this mix-up.



Installation sequence for pull-through blind rivet. Steps shown here and below seem to take place simultaneously.



Sequence in the installation of a friction-lock self-plugging blind rivet.



Installation sequence of a lock-spindle self-plugging blind rivet known as the "conical keystone lock."

SPEED PRODUCTION and LOWER COST on your products

with this

GRIP-NUT

family of GRIPCO FASTENERS

All types and sizes of Gripco fasteners listed in catalogue are available for immediate delivery.

Qualified fastener engineers are available for consultation on all your assembly problems.

Other Gripco Products:

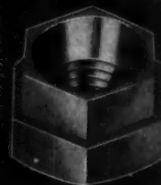
- BRASS GRIPCO OR CENTERLOCK NUTS.
- MINIATURE WELD AND CLINCH NUTS, WITH OR WITHOUT LOCK.
- GRIPCO AND CENTERLOCK HI NUTS.
- STANDARD SEMI-FINISH FULL AND JAM NUTS.
- STAINLESS STEEL LOCK, WELD AND SEMI-FINISH NUTS.
- COLD FORMED SPECIAL NUTS OR PARTS TO PRINT.



GRIPCO LOCK NUT
One piece all metal.



GRIPCO CENTERLOCK NUT
Locking feature in the center for fast feeding. Can be applied from either end.



GRIPCO CLINCH NUT
With or without Gripco Lock. For application to metal too thin to thread or for inaccessible assemblies. Hex collar prevents turning when torquing bolt.



GRIPCO PILOT-PROJECTION WELD NUT
With or without Gripco Lock. Centering collar positions nut and protects threads from weld spatter.



GRIPCO COUNTERSUNK WELD NUT
With or without Gripco Lock. Countersink protects threads from weld spatter.

The Nation's Oldest Manufacturer
of Lock Nuts

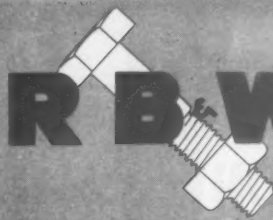
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113 MAPLE AVE. ★ SOUTH WHITLEY, INDIANA

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FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



Technical-ities

By John S. Davey

Quick facts on cold heading

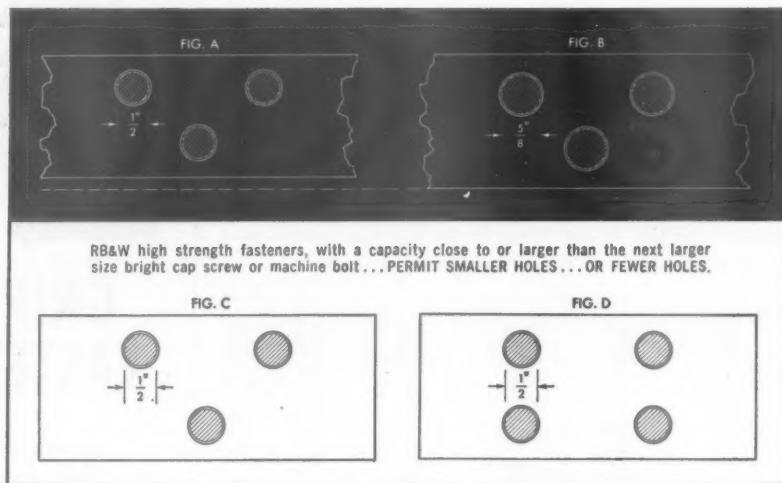
Compared to machining, cold heading gives stronger pieces at less cost. Also, the headers automatically control quality because unsound material cannot be used. While the scope of cold headers is wide indeed, it pays to design for them right at the start.

Some rules of thumb to guide you:

1. You save money after a run of 25,000 pieces (which pays for the set-up).
2. Maximum length of parts runs about 6 inches. Maximum volume of upset is equivalent to length of stock $4\frac{1}{2}$ times its own diameter. (With special operations, up to 26 diameters have been achieved!)
3. Various metals and alloys are suitable. But keep carbon content in steel to under 0.45.
4. Concentric pieces are easier to form, though eccentric and serrated shapes are practical.
5. Avoid sharp corners. Allow generous radii.
6. Because upsets are usually cylindrical, oval or round shapes take less trimming than square or rectangular.
7. Hollow upsets tend to form cracks at edges of recess, so avoid them.
8. Embossing raises costs.
9. No problem heat treating short sections. But long sections are apt to be distorted.

When in doubt, contact an expert in cold heading.

How high strength fasteners affect the holes they fill



RB&W high strength fasteners, with a capacity close to or larger than the next larger size bright cap screw or machine bolt...PERMIT SMALLER HOLES...OR FEWER HOLES.

As simple a matter as the selection of fasteners can permit changes for better design...and also improve production costs and service life.

In sketch "A", for example, you see one difference from use of RB&W high strength fasteners instead of machine bolts or bright cap screws, as in "B". You use a smaller size fastener. Holes are therefore smaller. The metal section, in turn, can then be smaller for a saving in material and weight. The costlier the materials (copper bus bars as a case in point), the more significant the cost savings.

In sketch "C", fill the 3 holes with $\frac{1}{2}$ " high strength bolts, and you have a load capacity close to 40,000 pounds. That's the same as developed by 4 bright cap screws filling holes in Sketch D. It costs less to drill and less to fill the 3-hole design.



RB&W High Strength Fasteners are now identified by this new marking as well as 3 radial dashes. They have the proper balance between ductility and hardness required in high carbon units.

EFFECT ON PERFORMANCE AND PRODUCTION

When tightened to their full load, high strength fasteners not only stay tight—even under vibratory conditions—but also exert high clamping force. It has been shown that, under high compressive forces, hole areas gain extra resistance to fatigue cracks.

What's more, the high friction developed virtually locks members together, prevents slippage. Holes, therefore, need not be perfectly aligned since they can even be slightly oversized without detriment.

There's an RB&W Fastener Man ready to aid you in working with high strength bolts—in the design stage or as replacement for SAE grade 1 or 2 steel fasteners or for rivets. Write for helpful booklet DC-1, Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.



Plants at: Port Chester, N.Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

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WHAT'S NEW IN EQUIPMENT

For information on any equipment listed here, use the postpaid card opposite page 66. Just circle the number on the card matching the number following the description. We'll do the rest.

SCREWDRIVER-NUTRUNNER DRILL IN ONE AIR TOOL

Three tools—drill, screwdriver, and nut runner—are incorporated in the No. 10 Series pneumatic screwdrivers and No. 10 Series drills. Interchangeability of parts between the series enables each of these tools to perform multiple jobs.

Features of the screwdriver-nut runner include an accurate non-friction type clutch that "rolls" when pre-determined torque is attained on screw or nut. Freedom from friction in the clutch permits operation for long periods without undue wear. Torque limit is pre-set by a locking device.

New air motors power both series with less air. All gear reductions utilize three-idler planetary gear trains, bushed for extra-long wear.

Cleco Div., Reed Roller Bit Co., 5125 Clinton Dr., Houston 20, Tex.

Use postpaid card. Circle No. 1

SNAP TORQUE TOOL GIVES ACCURATE MEASUREMENT

A torque tool that is said to do away with the dangers of over- and under-torquing precision work is single-setting and accurate. The operator feels and hears a "click" when the proper torque is reached. A wide variety of tool heads are available.

Milbar Corp., 1900 Euclid Ave., Cleveland 15, Ohio.

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MANUAL FASTENER TOOL DEVELOPS 6000-LB. PULL

A manually-operated fastener installation tool capable of developing a pulling force of 6000 lbs. installs fasteners from 5/32" to 3/8" nominal diameter in both steel and aluminum, with the exception of the Conical Keystone Lock (CKL) blind rivet.

Operation is provided by a low-friction ball screw mechanism. A projection of the screw, hexagonal in cross section, provides a means of applying a standard 11/16" wrench for easy operation. The projection is also provided with a 3/8" square socket, permitting

use of standard internal wrenches if desired. Continued rotation of the ball screw installs any fastener in a single stroke.

The Model 115 tool is 7 1/2" long and weighs 5 1/4 lbs. Length of stroke is 1 1/4".

Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Michigan.

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X-RAY RADIOGRAPHY FOR NON-DESTRUCTIVE TESTING

Non-destructive testing of pressure vessels, boilers, bridges, ships, pipe lines, aircraft and missiles can now be accomplished through Seifert industrial X-ray.

Included in the line are: mobile, highly sensitive, oil and water cooled Isovolt units, incorporating the constant potential voltage smoothness principle, for the radiographic examination of steel 2", 3", 4 1/4" and 5 1/4" or equivalent; and portable, heavy-duty Eresco, MS or X-Tron series units for 360° circumferential or 40° single port X-ray examination of equipment in the field or in laboratories.

Mitchell Radiation Products Corp., East Washington St., Norristown, Pa.

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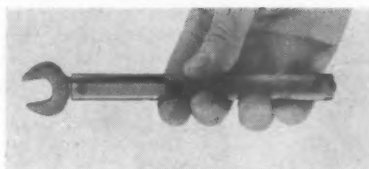
AIR NUTRUNNER DELIVERS 1200 IMPACTS PER MINUTE

An air-powered 3/8" nutrunner is 2" shorter and 3/4 lb. lighter than the preceding model, and claimed to deliver 40% more power and 100% faster run-down.

The toe-touch foot switch eliminates the operator fatigue of conventional secondary jaw motion control caused by extended foot movement to find and hold the intermediate position while aligning the work.

The 804 Impactool has a new direct drive impact mechanism and improved multi-vane motor. Maintenance costs are said to be cut by a steel hammer case bushing. Its nylon-composition, self-lubricating trigger is of "straight-pull" design.

The nutrunner weighs 5 7/8 lbs, is 6 3/8" long and has a side-to-center distance of 1 3/8". The tool runs with a free speed



(See 2)



(See 1)



(See 3)

of 6000 rpm at 90 psi air pressure and delivers 1200 impacts per minute.
Ingersoll-Rand Co., 11 Broadway,
New York 4, N.Y.

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TURNTABLES FEATURE QUICK INSTALLATION



Turntables feature ease of assembly and disassembly and meet specifications for both display and industrial transfer applications.

Designed for either permanent or temporary installations, the turntables are available in standard sizes from 4' up to 16' in diameter, having load-carrying capacities up to 3 tons.

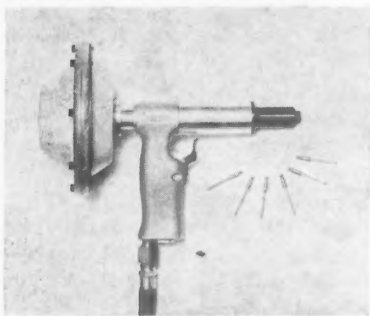
Installation or removal of just 12 bolts completely assembles or disassembles the turntable. A 2-man crew can completely install even the largest standard unit in less than 30 minutes.

Powered by a 1/2 hp a-c electric motor, the table is driven by a belt drive through a gear reducer then by a chain drive to a large sprocket on the underside of the upper circle. The standard design can be adjusted to operate within a speed range of 1/2 to 5 rpm.

Anchor Steel and Conveyor Co., 6906 Kingsley Ave., Dearborn, Mich.

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PNEUMATIC RIVETING GUN WITH 1000 LB. PULL FORCE



A riveting gun weighs less than four pounds and operates off plant air or by in-field air compressors. Peak efficiency is maintained even when the connecting air hose is as long as 60-70 feet.

The pneumatic gun will work off compressed air having a pressure between 60 and 90 psi. The stroke is 5/8" and the pulling force nearly 1000 lbs. The Texan is designed to pull nearly all sizes and types of Pop rivets including rivets with shank diameters up to 1/2" in steel or aluminum.

Pop Rivet Division, United Shoe Machinery Corp., Boston, Mass.

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REMOVABLE MAGNETS FOR SCREW DRIVING SOCKETS

A line of magnetic sockets used for driving self-tapping screws is now equipped with removable magnets. Worn-out sockets are simply replaced.

A special assembly tool inserts the magnet into a socket depth for proper magnetic contact with screw heads. Sockets and magnets are available in sizes from 1/4" to 9/16".

Snap-on Tools Corp., 8033 28th Ave., Kenosha, Wisconsin.

Use postpaid card. Circle No. 8



VIBRATING PARTS FEEDERS WITH UP TO 50 FPM SPEED



A vibrating parts feeder offers 120 cycles per second and up to 50 FPM speed.

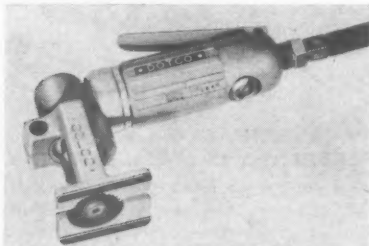
The stainless steeler feeder is available in sizes between 5" and 30" and allows 360° rotation. Controls are either self-contained or separate, with no rectifier required.

The Moorfeed 120 is said to eliminate dead spots and gives one minute bowl changes.

Moore Equipment Co., 1216 E. Michigan St., Indianapolis 2, Ind.

Use postpaid card. Circle No. 9

ATTACHMENT SPEEDS BLIND RIVET TRIMMING



A blind rivet trimmer attachment, for use with Dotco Model 1AE right-angle drive air tools has a large guide surface, assuring that the circular saw cutter is properly positioned and maintained in the correct cutting attitude. The attachment is moved over the work surface in the same manner as a flat-iron, reducing trimming time and also reducing the possibility of loosening

the rivet and marring the surrounding surface. Also, the rivet stem is trimmed square, which saves time in the subsequent shaving operation.

The Dotco rivet trimmer attachment can be used on universal type or countersunk type rivets, or on other similar types of fasteners.

Doeden Tool Corp., Sherwood, Ohio.

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SELF-IDENTIFIED COILS END WIRE MIX-UPS



Each coil of automatic welding wire now has the grade stamped on the inside of the liner, insuring positive, instant identification.

In addition to the stamped grade identification, liners on No. 2 coils are color coded—the colored stripe on the inside of the liner indicates the grade.

Page Steel and Wire Div., Monessen, Pennsylvania.

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PORTABLE 160 WATT-SECOND WELDING POWER SUPPLY



Designed to fill the need for a medium range capacitance-discharge power supply, a portable unit delivers up to 160 watt-seconds of energy in less than 0.002 of a second.

It permits reliable, distortion-free welding for such applications as mechanical filters, component packaging, semiconductor construction, relays, honeycomb and brazing foil assemblies as well as many other applications.

The Model 1034 can be used with tweezer handpieces or miniature welding heads for or with heavy-duty welding heads or handpieces for heavier work. The unit is completely self-contained.

Other features include a built-in watt-second meter, single stepless heat control, circuit-breaker off-on switch, which enables checking the firing pressure and electrode alignment of the



PHILLIPS SCREWS...the fastener with a plus!

Constant Product Improvement

- Change to 2° wing to provide more effective driving, better driver fit.
- Fillet added at upper edge of recess permits easier driver entry and freedom from burring.
- Introduction of penetration gaging which measures entry of Phillips driver into the recess and (indirectly) effectiveness of recess in performing its function.
- Decrease of nose angle on Phillips driver from 28° to 18° to prevent driver interference at its tip improves driver fit, increases header punch life in producing screw blanks, results in better, consistent quality.

give extra holding power, add structural strength

If your product requires rigid assembly, vibration resistance and maintenance of proper positioning of parts, Phillips cross-recessed-head screws are your best fastener choice. Here's why:

The "engineered fit" between Phillips driver and recess assures a positive purchase in any driving operation. This permits the maximum amount of torque to be applied, locking the screw to stay. With no danger of driver slippage, there's no cautious "holding back" and lessening of torque on the part of the operator. There's no need to back up screws a quarter turn to line up heads which weakens assembly. And, in wood products, Phillips screws can often be inserted without pilot holes—always a stronger assembly.

This greater holding power of Phillips screws is a big advantage in design and production. It lets you use fewer or smaller screws in a given fastening job, thereby saving weight and labor. But increased holding power is only one advantage of changing over to Phillips cross-recessed-head fasteners. They also increase production and improve appearance.

Together, these are the reasons behind today's national acceptance of the Phillips recess. It has been adopted by leading users and is represented in practically every type of assembled product. Its recess is reproduced in every type of head configuration. It has been constantly improved to increase driveability and quality. It is made to a universal standard by most leading fastener producers. Take advantage of these plus features; specify Phillips screws. e.e

SCREW RESEARCH ASSOCIATION

(Licensed Manufacturers of Phillips Screws and Drivers)

PHILLIPS CROSS-RECESSED-HEAD SCREWS...THE FASTENER WITH A PLUS

Use postpaid card. Circle No. 234

head or handpiece without discharging the power supply. The unit operates from any 115-volt line. It is forced air cooled to insure maximum component life.

Weldmatic, 380 N. Halstead Ave., Pasadena, California.

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THREAD ROLLING HEAD WITH REPLACEABLE BUSHING

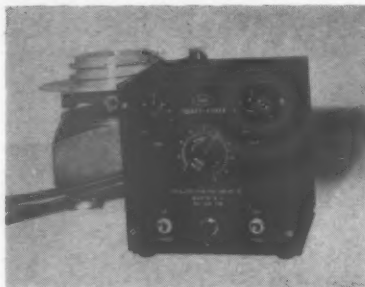
A revolving type thread rolling head has been developed for application to Landis automatic forming and threading machines and 4-spindle semi-automatic threading machines. Designated the No. 7 TRP (Thread Rolling pull-off), it has a 7/16" to 7/8" U.N.F. and U.N.C. range.

Feature of the new head is the replaceable helix angle bushings. One set of bushings functions as a "mean" helix angle for the entire U.N.F. and U.N.C. pitches and diameters within the range of the machine. When the exact helix is required for precision threads, the proper bushings can be supplied to obtain precision threads.

Landis Machine Co., Church and 5th Sts., Waynesboro, Pa.

Use postpaid card. Circle No. 13

ELECTRONIC DEVICE FOR JAM-FREE FEEDING



An electronic device permits automatically controlled feeding of small to sub-miniature parts.

The Kicker allows continuous feeding of miniature parts at rates slower than normally possible with standard amplitude settings suiting production line automation. The unit supplies to the feeder an automatically timed and adjustable energy impulse different than the regular amplitude, jarring the parts into further movement.

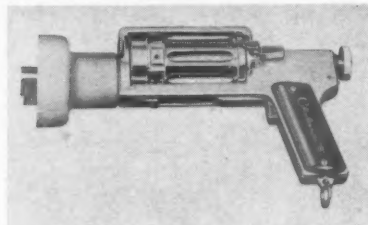
On standard devices these impulses are adjustable from 5 seconds to 60 seconds and in varying degrees of energy output as required by the nature of the pieces being fed.

Feeding speeds can be as slow as one per minute, up to 200 to 300 per minute. It also assists in the orientation and positioning of parts.

The machine is useful on any shape or type of part made from metal, glass, compressed powder, plastic and assembled parts in any size from .004" to 5". Units are also available on special order to assist movement of larger parts. Affiliated Manufacturers Inc., Oldwick, New Jersey.

Use postpaid card. Circle No. 14

AUTOMATIC DRIVER SETS EIGHT-STUD LOAD



A powder-actuated stud driver automatically sets eight fasteners with a single load.

The Columbia-matic 8 can deliver up to 16 shots per minute and cannot be fired automatically. It is suitable for fastening into steel, concrete or wood. The kit includes lanyard, goggles, ramrod and cleaning brush, with other accessories available.

The Columbia-matic "8" Corp., Division of The Columbia Mills, Inc., Syracuse 1, New York.

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"Me? Have production and shipment problems."

Allmetal offers immediate delivery for your stainless steel fastener needs. Thirty years of "Know How" specializing in the manufacturing of stainless steel fasteners is the best answer to your fastener problems. We are constantly alerted to maintain the type and quality of stainless steel fasteners you require for production. Do not hesitate to inform us as to your full requirements.

Write on your company letterhead for latest catalog. This too, automatically places you on our mailing list.



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GC-603 N. Y. PHONE: PIONEER 1-1200

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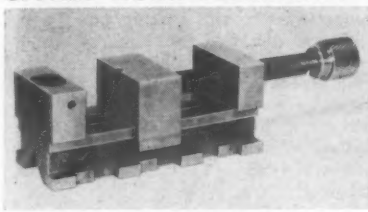
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TWX CG 3185 PHONE: AVENUE 2-3232, 3, 4

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TWX LA 1472 PHONE: WEBSTER 3-9595

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VICE AND V-BLOCK UNIT OFFERS WORK FLEXIBILITY

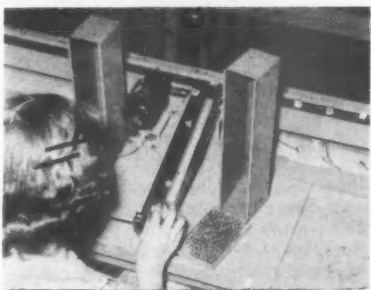


A 2 in 1 vise and V-block combination is made of hardened tool steel precision ground to .0004". Overall measurements are 2" x 2" x 5", jaw height—1". It can be used turned around, upside down, on all sides or end.

New Town Machine & Tool Co., Inc.,
2401 Atlantic Ave., Brooklyn 33, N.Y.

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ASSEMBLY WORK TRANSFER DEVICES FROM STOCK



A complete line of work transfer devices consists of off-the-shelf components, easy to assemble and dismantle.

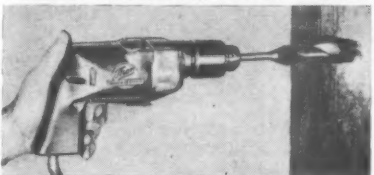
Expandable conveyors from 2" to 12" in width, travel tracks and trolleys for moving chassis, harness cable boards, transport dollies and other electro-mechanical devices are available.

Motor drives of both constant and variable speeds to 200 ft. per minute are featured.

Alden Systems Co., Box 125, Westboro, Massachusetts.

Use postpaid card. Circle No. 17

PORTABLE ELECTRIC DRILLS FOR STANDARD, HEAVY USE



Two new series of portable electric drills in 1/4-, 5/16-, and 3/8-inch capacities—a No. 1200 Series for heavy-duty, continuous operation and a No. 1300 Series for intermittent-service applications—have been introduced for home and farm shop, trade craft, and maintenance applications.

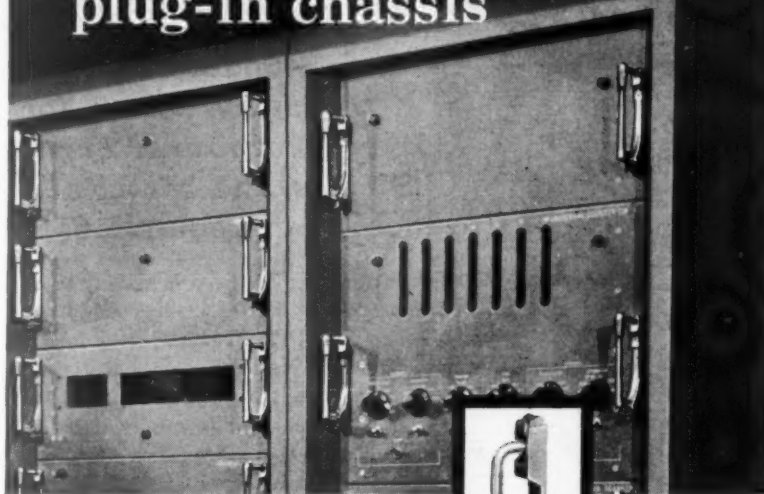
The 1200 Series is for constant-use applications requiring industrial-rated tools. The 1200 Series has sealed anti-friction ball and needle bearings and heavy-duty two-pole switch with locking pin.

The 1300 Series has anti-friction, oil-

DATICO "digital automatic tape Intelligence check out" is made by the Nortronics Div. of Northrop Corporation for the U. S. Air Force and U. S. Army Rocket & Guided Missile Agency. This money and man saving tool provides rapid weapon system evaluation. Note Camloc Chassis Latches.



IT'S EASY to open ■ close ■ carry ■ connect & disconnect plug-in chassis



with

CAMLOC

multi-function CHASSIS LATCHES



Thirty-eight strong, simple, attractive Camloc multi-function Chassis Latches are used on the 24 equipment filled plug-in chassis that make up DATICO, the military's new universal automatic field service checkout system. Here is a perfect example of designed-in fastener serviceability, flexibility, ease of handling and economy in interconnected "black-box" systems. When the Camloc push-button handles are released and pulled down, the chassis is automatically disconnected and ejected. Then the latch becomes a carrying handle. When replacing the equipment the latch firmly pulls the chassis back in place, making perfect, automatic reconnection of multiple-pin units. It is quick, safe, reliable, vibration-proof. Camloc Chassis Latches consist of only two parts—a handle and a fork—mounted with standard screws. Several handle and fork designs are currently available, all interchangeable. Write for Camloc's new Bulletin 35L today.

"Specialists in Fasteners for Industry"

CAMLOC FASTENER CORP. • 14 SPRING VALLEY RD., PARAMUS, N. J.
WEST COAST OFFICE: 5410 WILSHIRE BLVD., LOS ANGELES, CALIF. • SOUTH WEST OFFICE: 2509 W. BERRY ST., FORT WORTH, TEXAS.

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**MILWAUKEE
WROTH WASHERS**

JUST WHAT YOU WANT...

**Standard and
Special Washers for
Every Purpose....Sizes,
Shapes, and Materials
to meet your requirements**

Whether your immediate need is for tiny brass washers averaging 588,000 to the pound—or massive washers 23 1/4" in diameter, weighing 21 lbs. each — Wrought Washer has or can produce just what you want, to your specifications.

Over 100,000 sets of dies are available to you without extra cost. If your specifications happen to match any one of them, the cost of new dies is eliminated.

As the world's largest producer of washers, we offer you a dependable source of supply for the washers and stampings you need — anything that can be punched out of metal, plastics, fibre, and other materials—within the practical limitations of mass production.

You, as a user of washers, are assured of *highest quality* at competitive prices.

Send us your specifications so that we may quote on your washer or stamping requirements. Write for Catalog 40-A if you do not have a copy.



All Standard and S.A.E. sizes are available in 1-lb. and 5-lb. boxes as shown here and in 100- and 200-lb. containers for bulk orders.

WROUGHT WASHER MANUFACTURING CO.

the world's largest producer of washers
2195 S. BAY ST. • MILWAUKEE, WIS.



AS-9700

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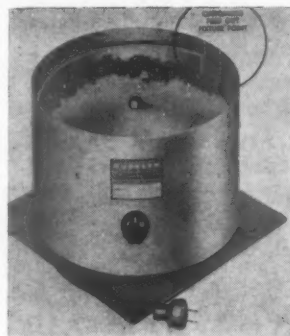
less ball bearings on armature and spindle, and UL-approved momentary contact switch with locking pin. These drills are designed for tasks in which the operation is not continuous.

All SpeedDrills fit the Thor No. 311 stand for conversion to lever-operated drill press for bench drilling in steel, plastic, wood, and other materials.

Speedway Div., Thor Power Tool Co., LaGrange Park, Ill.

Use postpaid card. Circle No. 18

SMALL PARTS FEEDER WITH INTERCHANGEABLE BOWL



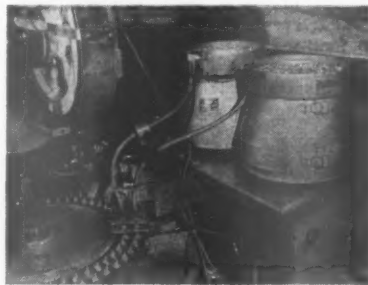
Re-design of a small parts vibratory feeder now gives interchangeable bowls and rheostat feed control.

Simplicity of design makes orientation work mostly a lathe turning job, eliminating costlier milling operations. Interchangeable bowls give extensive versatility to rugged basic unit. Factory orientation is also available.

Burklyn Co., 3429 Glendale Blvd., Los Angeles 39, Calif.

Use postpaid card. Circle No. 19

TRANSDUCER CONTROL AIDS VIBRATORY PARTS FEEDING



Proximity transducers have been developed for a new series of vibratory parts feeders.

The electronic controls are used as a sensing device on the track between feeder and assembly machine. The transducer can stop the machine when parts are exhausted, or recharge the feeder when it runs low on parts.

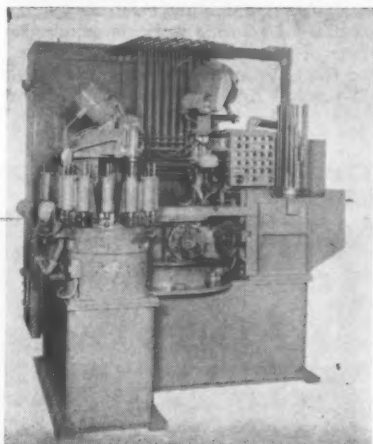
Feeders are manufactured in bowl sizes ranging from five to 25 feet in diameter.

The transducers, made by Electro Products Laboratories, Chicago, make no physical contact with the parts and thus do not wear out.

Perry Equipment & Engineering Co., 3100 Brandes St., Erie, Pa.

Use postpaid card. Circle No. 20

MACHINE ASSEMBLES SUB- ASSEMBLY AND FINAL UNIT



An automatic, hydraulic machine performs sub-assembly of two check valves and final assembly of complete pump body, at the rate of 300 pumps per hour.

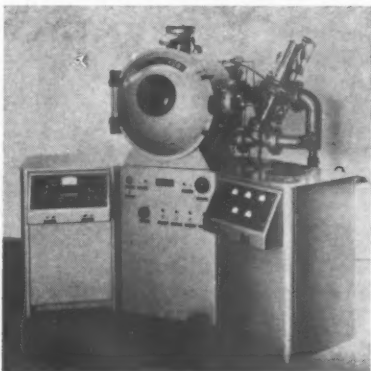
Parts of the check valves (ball, spring O-ring, retainer and snapping) are automatically assembled on two auxiliary dial index tables. The check valves are then assembled into the pump housing.

Oil seals are fed from an indexing magazine which automatically indexes from another stack. When one is empty, —provides a large storage capacity, seals are oriented and pressed into the housing. The machine checks the press, thereby preventing a loose seal.

The two cup plugs are hopper-fed to the pump body, pressed in and staked. Gray Equipment Co., 13600 Ford Rd., Dearborn, Mich.

Use postpaid card. Circle No. 21

ELECTRON BEAM WELDER IN PRODUCTION QUANTITIES

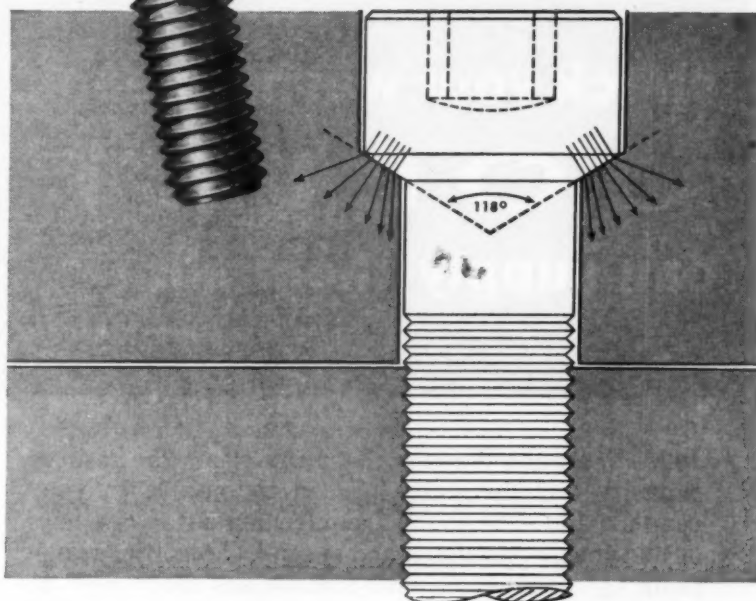
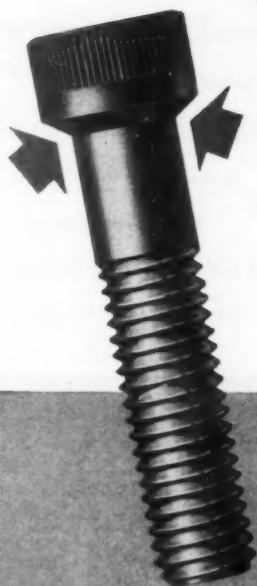


A welding machine is now in production utilizing the concentrated energy of a focused beam of high velocity electrons to weld metals.

The Beamatron will weld high temperature reactive metals and super-alloys. The Model B-1520 is designed for welding tubing or parts up to 3 3/4" diameter and in lengths up to 10'. A turntable can be installed for spot welding quantities of small parts.

All controls, instruments and high

new *Mac-it* IB Socket Head Cap Screw



**provides a 26.53% improvement
in working efficiency!**

(Even over the new 1960 Series)

The taper tells the story. It's the taper of the new Mac-it IB socket head cap screw that adds 16.66% more bearing surface without an increase in head size. And there's 14.28% less resultant compression because of the change in direction of stresses.

It takes 12% to 23% more torque to release a Mac-it IB

screw. That means it holds tighter. Indenting and corner fatigue are eliminated. And the new IB is self-aligning, tight-sealing, stronger, yet more streamlined.

Conservatively rated, the Mac-it IB socket head cap screw provides a 26.53% improvement in working efficiency.

YOUR MAC-IT DISTRIBUTOR will be glad to give you the facts on the new IB's right now; or write for new, illustrated specifications bulletin.

Mac-It Parts Co., Dept. 20, Lancaster, Pa.

MAC-IT ALLOY STEEL SCREWS



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 RIVETING (BURR) WASHERS ☐ LIGHT STEEL WASHERS ☐ FLAT WASHERS FOR
 PRE-ASSEMBLY (SEMS) ☐ S.A.E. WASHERS ☐ MACHINE SCREW WASHERS ☐
 ALUMINUM, BRASS AND COPPER WASHERS ☐ BELLEVILLE TYPE WASHERS ☐
 MALLEABLE BEVEL WASHERS ☐ MINE ROOF WASHERS ☐
 MALLEABLE ROUND WASHERS ☐ EXPANSION PLUGS ☐
 SPRING LOCK WASHERS ☐ HI-TENSILE STRUCTURAL WASHERS ☐
 SQUARE WASHERS ☐ CASTER SHIMS ☐ AN 960 FLAT WASHERS ☐
 MACHINERY BUSHINGS ☐

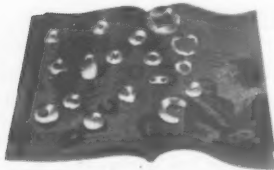


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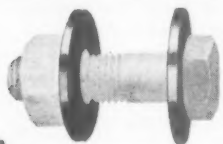
Joliet Wrought Washer Company offers the reserve capacity and flexibility needed to meet both your regular and emergency requirements for washers of all types — standard and special. Capacities range from 1/4" to 8" O.D. with thicknesses from .008" to 1/2". In all metals, all finishes, including heat-treating.

SPECIAL WASHERS

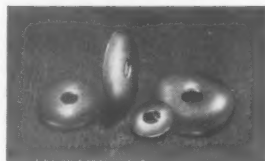


We maintain our own tool and die shop assuring you the utmost in prompt service on new tooling. Your orders are never too large for adequate service, nor too small for personal attention.

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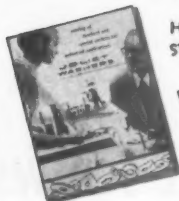


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310 Connell Avenue — Joliet, Illinois

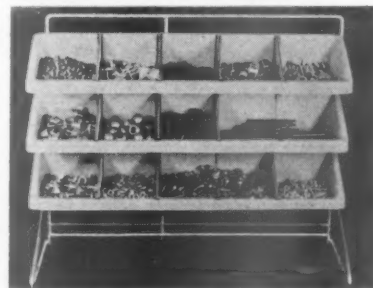
Use postpaid card. Circle No. 239

voltage power supply are housed in a console-style cabinet. The vacuum chamber, containing electron gun and collet for rotating work, is mounted on top of the cabinet.

High Vacuum Equipment Corp., 2 Churchill Rd., Hingham, Mass.

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THERMOPLASTIC PARTS CUP SIMPLIFIES ASSEMBLY



A 20" long parts cup may be divided into from two to five compartments. Used without dividers, the cup can accommodate wires or longer parts. Separation is obtained by inserting the removable dividers into spaced grooves within the cup.

Formed of U.S. Royalite, a tough thermo-plastic, the Duro cup features durability and one-piece seamless construction. Royalite will not chip, dent, crack or flake and is absolutely non-magnetic. It measures 4" wide and 4" deep.

Hollywood Plastic Arts, Inc., 4560 Worth St., Los Angeles 63, Calif.

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SLIM PARTS CONVEYOR FITS INTO CRAMPED AREAS



Designed to fit into cramped spaces between machines and within existing production lines, a parts conveyor is only 4 1/2" wider at any point than the conveyor belt.

Easily moved from machine to machine, it can be set for any incline angle from 22° to 45° by adjusting telescoping legs.

Eighteen models with belts from 6" to 24" wide and 4' to 12' long are available. Comes with loading chute and mechanical backstop.

Bosworth Mfg. Co., 34250 Mills Rd., Avon, Ohio.

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Assembly and Fastener Engineering

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assembly and fastener engineering

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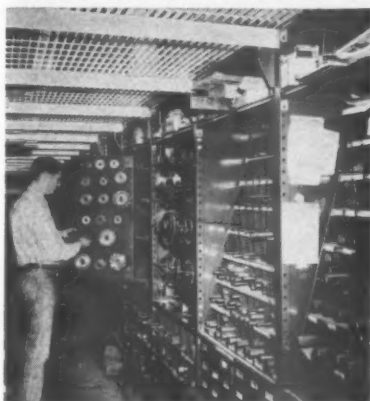
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SHELVING EQUIPMENT HAS TOOL STORAGE INSERTS



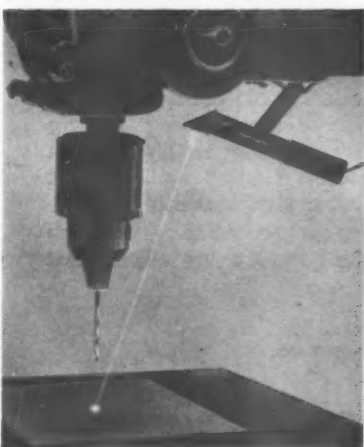
A complete line of tool storage equipment, including a new standard tool shelving section, is combined with sloping front tool storage inserts for storage of drills, taps, and small tools; swinging mounting panel inserts for orderly storage of milling cutters; shelf boxes; shelf dividers; and bin fronts.

Other accessories include sloping shelf inserts, pigeon hole inserts, six shelf sloping compartment inserts with adjustable dividers, drawer case units, drawer trays, shelf separators, mounting panels for use on backs and rack ends of shelving sections.

Lyon Metal Products, Inc., 3 Plant Ave., Aurora, Ill.

Use postpaid card. Circle No. 25

WORK LOCATOR LIGHT FOR ASSEMBLY MACHINES



A locator light for drill presses, terminal setters, punches, riveting machines and similar equipment pinpoints the work area accurately and quickly with a beam of light. It is particularly useful in riveting and terminal setting, where the desired "spot" is often hidden by the work itself.

Just 3½" long, the adjustable Locolite comes complete with transformer, prism, long-life bulb and easy-to-mount bracket.

Black & Webster, Inc., 570 Pleasant St., Watertown 72, Mass.

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HARPER HOT HEADING

Extends the cost saving advantages of cold heading to large parts and parts of unusual shape

Three unique new hot forges open a field over and beyond the usual "upset from bar stock" type of finished hot headed part. The new equipment *both upsets and hammers* the part in a single sequence. Tool costs are low! Usual shapes, such as wrench handles, axle housings, eye bolts of 2" diameter, can be easily produced. Write today for factual literature.



New hot forging unit produces unusual configurations in Stainless Steel, Monel, Silicon Bronze, Naval Bronze, Copper, Brass, Titanium and Aluminum.

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See PROGRESSIVE for parts like these

Progressive is saving its customers up to 70% on special fasteners. Very likely we can save you thousands of dollars on many of your small metal components.

On parts such as these, Progressive's cold forming method is superior to other fabricating techniques. Scrap is eliminated because the metal is formed into shape, not machined away as expensive scrap. Primary and secondary operations may be combined more readily to effect savings in machine time and between-machine materials handling. Work quality is just as you want it — we won't let it out unless it is.

You may have parts right now that our engineers could value analyze for you. Send us the prints. A Progressive quote is a sure indicator that you are buying right!

Machine screws and special fasteners are our business . . .
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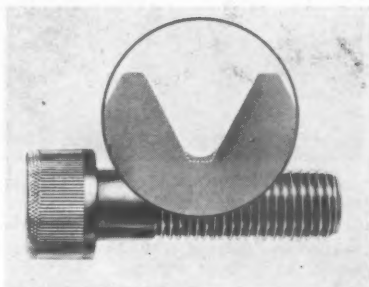
STANDARDS AND SPECIALS CUSTOMIZED FOR YOUR NEEDS

THE TORRINGTON COMPANY

Progressive Manufacturing Division
40 Norwood Street • Torrington, Connecticut

WHAT'S NEW IN FASTENING AND JOINING

For further information on any of the fasteners listed here,
use the handy postpaid card opposite page 66.



(See 31)

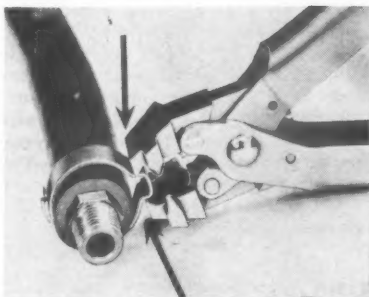
SET SCREW CONE POINT CENTERED IN CUP EDGE

A socket set screw is constructed so that its cone point makes contact with the engaged work before the cup edge, which is also an integral part of the fastener.

The W-Point set screw is said to provide 30% more backout torque, 50% more resistance to rotary slippage and 50% more resistance to vibration than conventional cup point socket set screws.

The fastener is claimed to track evenly and with a well-defined even groove, resulting in positive frictional contact of both flanks of the cup with the engaged work. The W-Point acting as a fixed point, will prevent oscillation of the cup edge and minimize the tipping effect of key tightening.

Parker-Kalon Div., Clifton, N.J.
Use postpaid card. Circle No. 27



(See 30)

FLEXIBLE EPOXY ADHESIVE RESISTS SHOCK, PEEL

Where good flexibility, shock and peel resistance is desired, EC-1472 epoxy resin adhesive is recommended by the manufacturer.

After a seven-day cure at room temperature under contact pressure, it is said to present an excellent balance of properties. Tests indicate shear strengths of 3430 psi at room temperature and 2030 psi at -65°F. This adhesive should not be used in applications over 120°F.

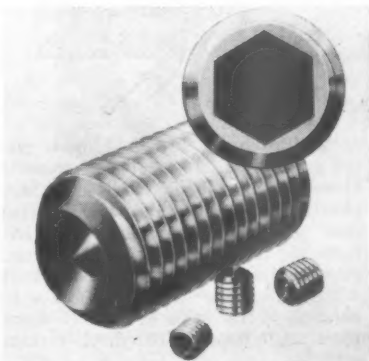
AC&S Div., Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.
Use postpaid card. Circle No. 28

SOLDER-TYPE ALLOY IN SQUEEZE BOTTLE

Solder-type alloy in paste form can be applied from a plastic squeeze bottle, or through automatic applicator devices in larger production runs.

Eutec-Tin-Weld T-1 (AutoChemic) avoids settling out of its heavier activity and performance of the alloy.

The user holds the plastic bottle over the joint, applies slight pressure and neatly extrudes exactly the amount of alloy desired. This is ideal for such



(See 27)

industries as electronics, jewelry, automotive repair, plumbing, refrigeration and air conditioning.

Eutectic Welding Alloys Corp., 40-40 172d St., Flushing 58, N.Y.
Use postpaid card. Circle No. 29

ONE-PIECE HOSE CLAMP FOR QUICK APPLICATION

A one-piece hose clamp for low pressure hose and tubing, clamps permanently with only one squeeze of a simple tool. The single lug mechanical-lock Circle clamp has only one U-shaped locking lug which results in greater setting speed in assembly.

Squeezing the clamp's locking lug tight with toggle-action or pincer pliers or pneumatic setting tool decreases the inside diameter of the clamp so that it firmly binds the hose to its fitting. At the same time, the clamp metal takes a permanent "set" in place and reportedly cannot work loose due to vibration, pressure, twisting or improper handling.

The 1010 steel clamp is available in 15 standard sizes ranging from 42" I.D. to 1.22" I.D. A double lug variation accommodates diameters to 2 1/2".

Circle Clamp Div., Cuyahoga Products Corp., 10252 Berea Rd., Cleveland, Ohio.

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NEW THREAD ROOT FORM ADDS SCREW FATIGUE LIFE

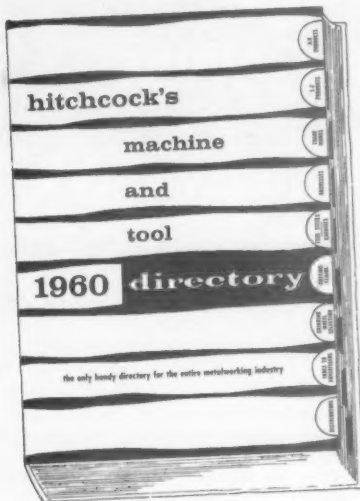
A new thread form that is claimed to as much as double fatigue life under dynamic loading has been added to the Unbrako socket head cap screw line.

Big change in the thread form is its smoothly radiused root, contrasted to the conventional flat root—a truncated V-shape with sharp corners.

As shown by calculations of 1/4-28 size threads, the stress concentrations in the conventional flat root are so much as six times those in the smooth shank of the stressed screw. By comparison, the new radiused root—called Hi-Life—scales stress concentrations down to a factor of 3.4.

With a smoothly radiused root blending continuously into the flanks of the

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ASSURANCE that your product story will be in the hands of 30,000 key buying influences in the metalworking industry thruout 1960.

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Reserve space now!

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Hitchcock's Machine and Tool Directory
Wheaton, Illinois
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Please send me your free folder giving complete information about the 1960 Edition.

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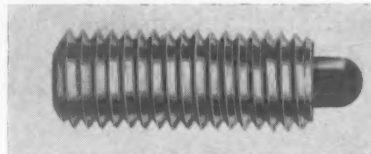
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thread at a depth of engagement of 83-1/3%, the form approximates that of the Mil-B-7838A thread specification introduced in 1950. The improvement in thread form has been made without affect on gaging or ease of engagement of the screw with mating female threads. The form falls within the H-28 Handbook's Class 3A screw thread specifications.

Standard Pressed Steel Co., Jenkintown, Pennsylvania.

Use postpaid card. Circle No. 31

HEX NOSE SPRING PLUNGERS SPEED FIXTURE LOADING



Hex nose spring plungers feature large bearing surfaces which overcome binding and are said to assure perfect alignment of the plunger at any extension.

Installed with a standard end or socket wrench, the plunger's concentricity between axis and body diameter is held to .0015" T.I.R.

Loading and unloading of jigs and fixtures is speeded by radiused nose.

Vlier Engineering Corp., 8900 Santa Monica Blvd., Los Angeles 46, Calif.

Use postpaid card. Circle No. 32

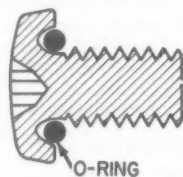
WASHERS KEEP CARRIAGE BOLTS FROM TURNING

Washers made of 1010 steel are designed to keep carriage bolts from turning.

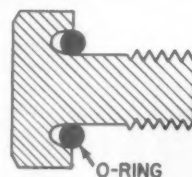
The Torque Washer fits over the square section underneath the head of the carriage bolt. The four prongs imbed securely in the fibers of the wood and hold the carriage bolt from turning, either clockwise or counter-clockwise. This permits the nut to be removed or tightened.



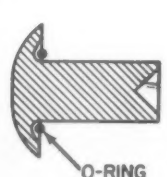
HIGH-PRESSURE, ONE-UNIT, SEALING DEVICES



O-RING



O-RING



O-RING

High-pressure sealing boots, seals and fasteners are designed to protect against dirt, fumes and moisture; for vibration-resistance and for maintaining pressures within an enclosure or housing.

The fasteners are vibration-resistant due to the O-ring pressed into a groove under the head. Tightening compresses the O-ring to achieve high pressure sealing.

Stainless Seelscrews, either slotted

Ace Engineering Associates, Inc., 3901 Grand Ave., Oakland 10, Calif.
Use postpaid card. Circle No. 33

FLOATING DOME NUT IS LIGHTER, STRONGER

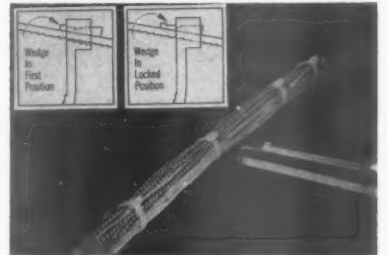
Design changes have been made in two-lug, self-sealing, floating dome nut in the 5/16-24 thread size. The new nut, No. 14634H-054, is 35% lighter, 100% stronger in torque-out and its narrower envelope makes it useful in area where space is limited.

Nutt-Shel Co., 2701 S. Harbor Blvd., Santa Ana, California.

Use postpaid card. Circle No. 34



ALL-NYLON BAND CLAMP RESISTS SLIPPING



A band clamp made entirely of non-conducting, non-corrosive nylon employs a unique design that combines the advantages of ratchet teeth and wedge to prevent slipping.

Ratchet teeth engage with matching teeth inside the clamp loop. The two-position, floating wedge is notched and can be engaged with a rib on the inside of the loop to provide a permanent lock.

The band is snubbed up as tight as desired for a secure, but temporary lock. But, when the wedge is pushed all the way in, engaging the wedge notch with loop rib, the clamp becomes permanent and can only be released by cutting the band.

Weckesser Co., Dept. AE-3, 5701 Northwest Hwy., Chicago 46, Ill.

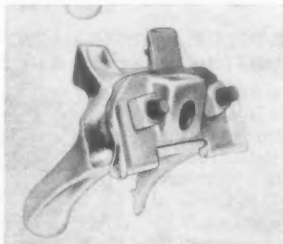
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or Phillips-head, will hold more than 500 psi of internal or external pressure. Hex-head Seelbolts are cadmium-plated carbon steel and will maintain 2500 psi. Aluminum alloy Seelrivets have the dimensions of AN470 rivets. Also available are toggle switch boots withstanding up to 500°F, seals for rotating shafts from 1/8" to 1/2" diameters and boots for push-button switches.

continued

Metal Process Co., 1801 First Ave.,
New York 28, N.Y.
Use postpaid card. Circle No. 38

TWO-PIECE IRON CLAMPS FOR AERIAL CABLES



A line of suspension clamps offers a new method of attaching aerial cable to wooden poles.

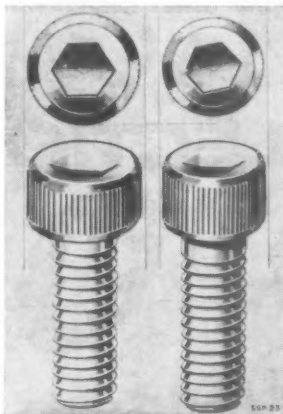
MIF clamps have two basic pieces—spacer body and clamp plate. The spacer body resists sinking into soft poles, maintains clearance from pole surface to cable while spurs on the pads resist vertical movement. Pads are curved to fit the pole.

A lip below the messenger groove assures support of the messenger. A "stringing finger" facilitates stringing the messenger for field spun cables.

Grooves in body and plate are smooth for messenger protection and funneled to permit angle and tangent runs. Each plate has a second groove for optional ground wires.

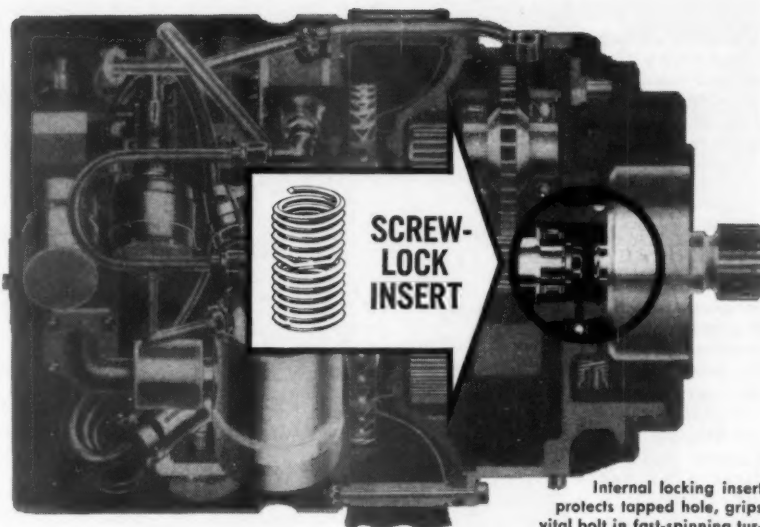
Pole Hardware Div., Malleable Iron Fittings Co., Branford, Conn.
Use postpaid card. Circle No. 37

CAP SCREW LINE DESIGNED FROM NEW ASA STANDARDS



A complete line of cold forged socket head cap screws will be manufactured to the new standards agreed upon by the ASA. The cap screws will be in addition to the presently accepted standard types.

Main features of the cap screws are the larger head and the bigger hex wrench pads. Subcommittee recommendations of the ASA group were adopted upon extensive research, testing and development. Benefits in the new design include: Greater tightening torques without rupture of the head—large hex wrench pads permit exertion of greater



at 46,000 R.P.M.

HELI-COIL®

SCREW-LOCK INSERT*

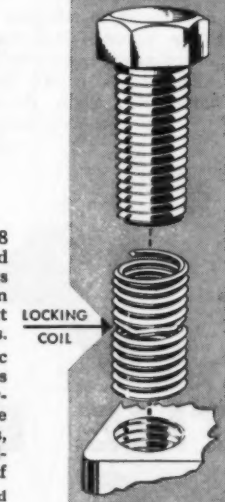
holds this vital bolt fast
...Without Lock Washers
or Lock Wiring!

Even when the turbine shaft of General Electric's new AS-18 turbostarter whirls at 46,000 rpm... the key bolt at the end of the shaft can't work or wear loose. General Electric puts a one-piece, *internal locking Heli-Coil Screw-Lock Insert* in this tapped hole, gets thread security in this important threaded assembly despite vibration met at high shaft speeds.

In addition to the critical shaft application, General Electric uses more than 40 of these *Heli-Coil* stainless steel wire inserts throughout this compact 165 hp starter for aircraft gas turbines. Production and performance benefits? Unshakable fastener security *without* the use of clumsy, heavy lock nuts, lock washers and lock wiring... lighter weight... less installation cost... faster and easier assembly and disassembly of this tiny power pack that weighs only 46 pounds! *Patented

Heli-Coil Screw-Lock Inserts

- positively lock screws and bolts against loosening under impact and vibration
- prevent thread wear, stripping, corrosion, galling and seizing
- eliminate lock nuts, lock wiring, other supplementary locking devices
- can be used in standard proportion bosses without need for redesign
- are available in a complete range of U.N.C. and U.N.F. thread sizes
- save assembly time, space, weight and cost
- meet military specs for locking torque and vibration



Principle of Heli-Coil Screw-Lock Insert. Locking center coil grips screw in tapped hole; holds screw firmly against vibration and impact.



HELI-COIL CORPORATION
DANBURY, CONNECTICUT

HELI-COIL CORPORATION, 3109 Shelter Rock Lane, Danbury, Connecticut

Send complete design data on Heli-Coil Screw-Lock Inserts

NAME _____ TITLE _____
FIRM _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____ 1772

IN CANADA: W. R. WATKINS CO., Ltd., 41 Kipling Ave., S., Toronto 18, Ont.

Use postpaid card. Circle No. 243

tightening torques with equal distribution over a larger area; higher loads without indenting material—more bearing area under head distributes loads over greater area; longer life, even under tough usage.

Set Screw & Mfg. Co., Bartlett, Ill.
Use postpaid card. Circle No. 38

TAPPING SCREW GROUNDS ELECTRICAL WIRES

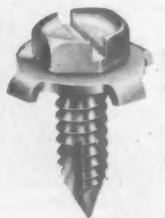
A 10-24 screw is designed for appliances requiring electrical grounding protection for the user.

The 5/16" slot-tapped hex-headed fastener performs three distinct functions. It is thread cutting. Its enamel reaming point removes finishes from the hole, eliminating a separate reaming operation. A pre-assembled tab washer, with legs adaptable to various ground wire sizes, retains the wire loop under its bearing surface.

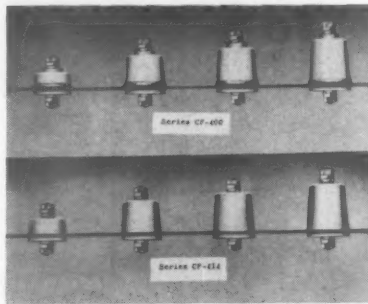
At time of installation the one-piece unit is loosened, not disassembled, to connect ground wire to appliance.

Shakeproof Div., Ill. Tool Works, St. Charles Rd., Elgin, Ill.

Use postpaid card. Circle No. 39



HERMETIC SEAL, TEFLON FEED-THRU INSULATORS



Two series of Teflon feed-thru insulators, designed for permanent and demountable applications, incorporate a hermetic solder seal.

The semi-permanent, or demountable seal, designated the Chemelec CF-414, utilizes silicone rubber "O" rings to establish seal between the insulator body and the bed plate and between the feed-thru terminal and the insulator body.

The permanent CF-400 Chemelec insulator provides a fluorocarbon-metal fused seal permitting the insulator to be soldered directly to the deck. This seal is of such quality that it is capable of holding a vacuum and containing oil for indefinite periods.

The Series CF-414 is a moisture proof

insulator which has the same thermal and mechanical shock resistance characteristics as the 400 series.

Fluorocarbon Products Inc., Camden 1, New Jersey.

Use postpaid card. Circle No. 40

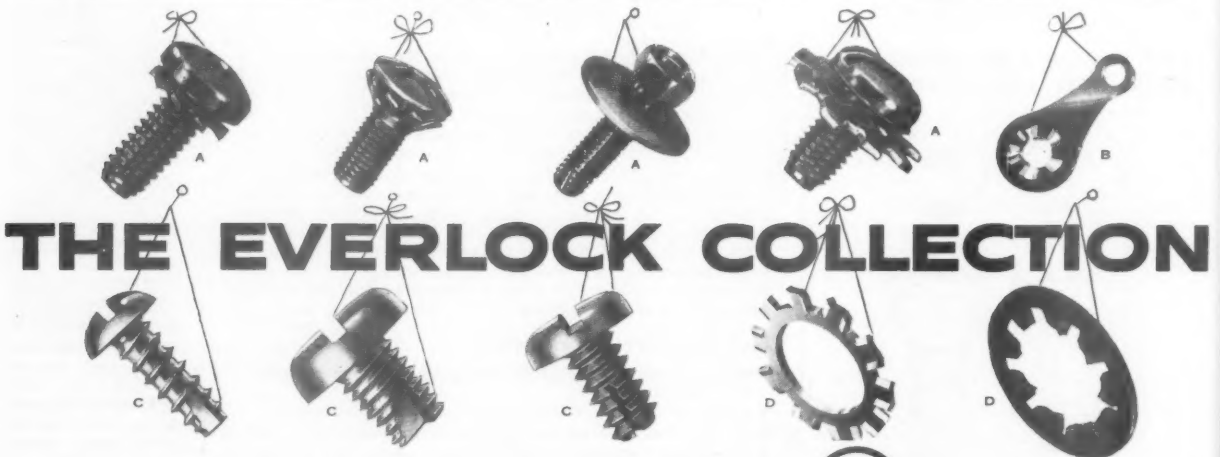
ONE-PIECE ELASTOMERIC MOUNTING RESISTS SHOCK

A double extension center bonded mounting for isolation of severe vibratory, shock and related disturbances has been developed as a flexible suspension for all types of mobile, transport-mounted and portable equipment.

The mounting is of simple one-piece construction with elastomeric flexing element permanently bonded to steel inner member. Elastomeric end extensions are pre-compressed at installation to form two rebound shoulders for reverse loads. These shoulders in combination with the third compression section provide excellent load carrying and rebound characteristics. No lubrication or maintenance is required. Service life is outstanding.

Lord Mfg. Co., 1639 W. 12th St., Erie, Pennsylvania.

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NOW MORE EXTENSIVE THAN EVER—OUR COMPLETE LINE OF INDUSTRIAL FASTENERS AND COLD-HEADED SPECIALTIES

These are just a few of the many Everlock industrial fasteners used consistently by leading automotive, appliance and other metalworking manufacturers—some of them our customers since 1918. When you buy Everlock fasteners, you deal with one of the few completely integrated manufacturers of lock washers, Sems, thread-cutting screws, terminals and cold-headed specialties. We are prepared to deliver on short notice a complete line of competitively priced, top quality washers from stock in our plant or your local distributor's warehouse. Talk to your local Everlock representative for expert assistance with fastener problems or use the coupon to send for samples and our current catalog. Blueprints welcome! Let us quote on any of your fastener needs.

A. Sems—Available with any style head, thread, washer and point. **B. Terminals**—Tooth-type locking or plain. **C. Thread-Cutting Screws**—Type 1, 23 and 25. **D. Lock Washers**—Tooth-type lock available in internal, external, countersunk, combination internal-external, dish-type, and dome washers. Also Belleville or serrated Belleville.



Thompson-Bremer & Co.
Division of
American Machine
& Foundry Company

Thompson-Bremer & Co., 228 N. LaSalle Street, Chicago 1, Ill.

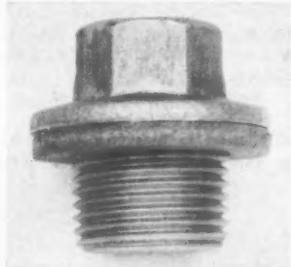
Please send me: **AFE-9**
Everlock fastener catalog _____ samples of
Everlock industrial fasteners and cold-headed specialties.

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Company _____
Street _____
City _____ Zone _____ State _____

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Assembly and Fastener Engineering

DRAIN PLUGS WITH PRE-ASSEMBLED WASHERS

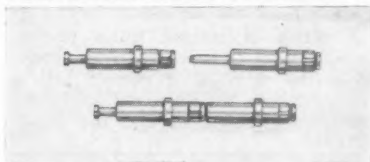


Designed to reduce handling costs, drain or filler plugs are now fabricated with pre-assembled washers and sold as an integrated unit. The new cold formed plug is available in steel with neoprene or fiber washers permanently affixed. Threads are rolled to NSPM straight pipe specifications. Present stock assemblies are limited to $\frac{3}{8}$ "-18 sizes.

Pittsburgh Plug and Products Corp.,
P.O. Box 304, Evans City, Pa.

Use postpaid card. Circle No. 42

COMBINATION PLUG & JACK FOR ELECTRICAL PANELS



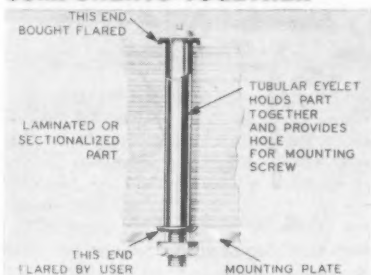
A combination plug and jack permits piggy backing of patch panels with additional plugs. It can be plugged into a Cambion 2378 jack on a board and another plug can be plugged into it.

Equipped with a D slot or key and compression spring for permanent gripping power, the No. 2650 assures solid electrical connections at all times. It is available in shank lengths from .062" to .219", has a .045" pin, and is processed from brass with a bright alloy plate.

Cambridge Thermionic Corp., 445
Concord Ave., Cambridge 38, Mass.

Use postpaid card. Circle No. 43

TUBULAR EYELETS CLAMP COMPONENTS TOGETHER

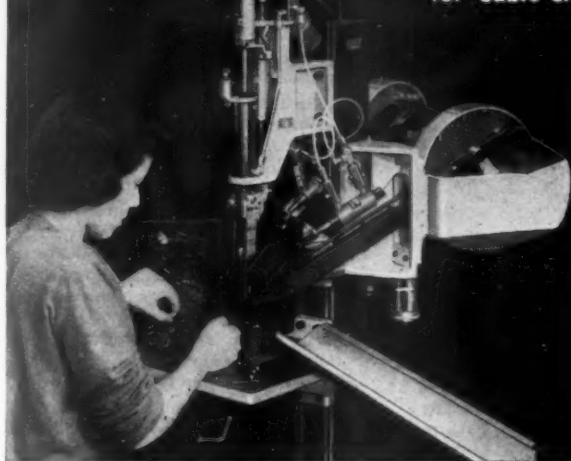


Tubular eyelets in sizes up to $\frac{1}{2}$ " O.D. and any desired lengths are said to cost less than drawn eyelets for lengths over about 1".

Eyelets are used to clamp together components of an assembly and pro-

DIXON *Auto-Torque Driver*

Speeds Assembly and Screw Driving
for Cable Clamp



2000 Hand-Fed Assemblies Per Hour—Two Parts Placed With A Single Chuck

The machine shown above, which is tooled for the assembly and screw-driving work for a three-part cable clamp, is a good example of the adaptability and versatility of the DIXON *Auto-Torque Driver* (Automatic Screw Driver). Two feeders place the Phillips Head Screw and one part of the clamp in a single chuck with positive action. The self-tapping screw is then driven to a predetermined depth into the base part, which has been placed in the fixture by the operator.

Exclusive Design Features Provide Accurate, Dependable Operation

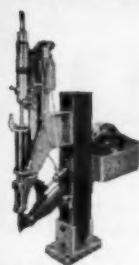
Many design features contribute to the over-all efficiency and dependable operation of the DIXON *Auto-Torque Driver*, which is furnished in standard models or as special arrangements. Chief among these is the positive-acting feeder with ram-action placement of the part into the chuck. This feeder is compact, with a straight track and an orienting block to avoid jams, assuring proper entry of the screw or nut into the feed track.

A built-in sensing mechanism operates automatically to stop the machine when a screw is missing or only partially driven. This assures quality control and is essential for automatic installations. The sensing feature is also of great value when driving a screw or nut to a predetermined depth without torque requirement.

Another important feature is the *Adjustable-Torque Clutch* which can be furnished in two torque ranges. It represents a new high in accuracy, ease of adjustment, and smooth operation. Accuracy is within 5% of the torque setting and it can be furnished for closer tolerances for special applications. It cannot overdrive the screws.

Ask for Descriptive Matter or Special Information

Complete information on the standard DIXON *Auto-Torque Driver* is given in Bulletin SD-B1. This and bulletins on other units are available on request. Tell us your requirements.



The standard *Auto-Torque Driver* as furnished for use as a fully automatic station. Also built as a pedestal model with foot treadle for starting the cycle.

OTHER DIXON EQUIPMENT



Auto-Positioner for small parts assembly. Furnished as automatic station or as pedestal model.



Positive-Acting Piece Parts Feeder for delivering small parts to assembly machines, presses, etc.



Parts Escapement for releasing parts singly or in multiples.



DIXON AUTOMATIC TOOL, INC.

2309 - 23RD AVENUE

ROCKFORD, ILLINOIS

EQUIPMENT FOR AUTOMATIC PARTS HANDLING AND ASSEMBLY

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vide a method of mounting the assembly by a screw through the eyelet. The straight end of the eyelet is flared after assembly. Rolled, flared, or beaded ends can be supplied.

H & H Machine Co., Inc., Noble and Jackson Sts., Norristown, Pa.

Use postpaid card. Circle No. 44

ANCHOR BUSHINGS FOR MAKING DRILL TEMPLATES



Press type anchor bushings provide a simple and quick method for making drill templates.

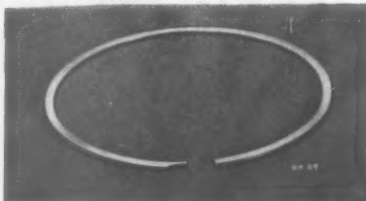
The bushings are pressed into drilled or punched holes in .060" or thicker aluminum template material. The double row of serrations at the base of the bushing body provide a positive lock into the template material to resist drill torque.

Drill sizes No. 55 (.052) through 7/16 (.4375), are accommodated by only three bushing pilot sizes.

Hi-Shear Rivet Tool Co., 2600 W. 247th St., Torrance, Calif.

Use postpaid card. Circle No. 45

ONE-TURN RETAINING RING FOR LIGHT-DUTY SERVICE



Single-turn retaining rings are designed for light-duty applications such as in lens mounting, phonograph turntables and other products where retaining rings are exposed to view.

The Spirolox ring is available in plain or stainless steel with cadmium, zinc or lubrite finishes. Rings are made in diameters from 1/2" to 5", requiring no special machining, counterboring or turning of shoulders.

Ramsey Corp., 3693 Forest Park Blvd., St. Louis 8, Missouri.

Use postpaid card. Circle No. 46

HIGH-TEMP BRAZING ALLOYS FOR MACHINABLE FILLETS

A high-nickel brazing alloy for high-temperature service produces joints with lower hardness that are said to be more easily machined. Hardness before brazing is 35 to 40 Rockwell C, softest of all nickel-base brazing alloys.

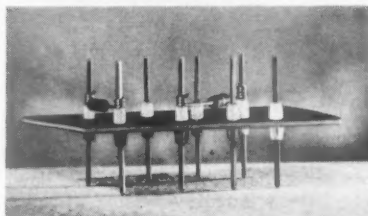
Microbraz No. 160 has a low boron content, a wide melting range and is

good for use with larger brazing clearances. Good wetting and flow characteristics produce smooth, uniform fillets.

Stainless Processing Div., Wall Colmonoy Corp., 19345 John R. St., Detroit 3, Michigan.

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NYLON LOCKING TERMINALS NEED ONLY MOUNTING HOLE



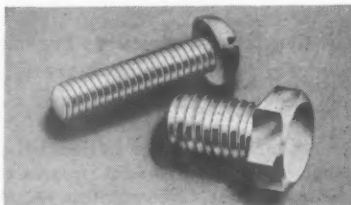
Insulated wire wrap standoff and feed-through terminals with a self-locking nylon body provide one-step insertion. Pushlock terminals are pushed into place with arbor press, drill press or simple hand tools.

The terminals are suited for applications where shock and vibration are problems. They are used in conjunction with printed circuitry and other miniaturized electrical and electronic equipment.

A series of molded flutes project radially from the molded nylon body. When the terminal is pressed into a mounting hole, the flutes deflect, creating holding power around the inside

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AMERICAN CANCER SOCIETY

Assembly and Fastener Engineering

circumference of the hole. They will continue to exert this pressure under temperatures from -65° to $+300^{\circ}$ and with exposure to oils, greases and common solvents.

Whitso, Inc., Dept. AE-3, 9330 Byron St., Schiller Park, Ill.

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NYLON CABLE CLAMPS WITH QUICK RELEASE TABS



Nylon cable clamps incorporate a miniature quick-release tab. This tab also allows adjustment of the cable clamp or tie to accommodate wire harnesses from $\frac{1}{8}$ " to 2" in diameter.

Lok-Straps are supplied in only one size: all that is required to replace a complete range of conventional cable clamp sizes.

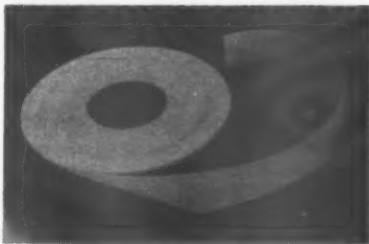
For point-to-point wiring the clamps are mounted before wires are laid, then snapped around the wires as the harness is fabricated. Ties are then installed between the clamps to secure wire where necessary.

They have excellent electrical insulating characteristics, high tensile strength and a service temperature range from -65° to $+350^{\circ}$ F. (unmold, 480° F.)

Panduit Corp., Dept. AF, 14461 Waverly Ave., Midlothian, Ill.

Use postpaid card. Circle No. 49

FUSED TEFLON TAPE WITH TOP ELECTRICAL PROPERTIES



Four grades of tape made by skiving Teflon billets are said to feature excellent electrical properties, resistance to all common chemicals, a low coefficient of friction and a surface to which nothing will stick.

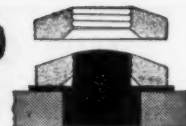
The tapes are designed primarily for high temperature and high frequency wire and cable insulation. However they may also be used as stock from which gaskets, seals and miscellaneous small parts can be cut. These tapes range in width from $\frac{1}{4}$ " to 12" in $\frac{1}{8}$ " increments. Their thickness range for grades ST-X, ST-C and ST-1 is .002 to .060", .089" and .100". Grade ST-2 is avail-



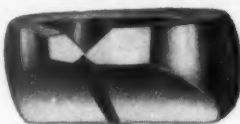
Flat end snubs against object and grips where rounded nose pliers would fail.



Deep cut-teeth provide secure grip. Curved sections have large, deep-broached teeth to grip pipe, etc.



Special slotted washer and chamfered nut provide lock-washer action — will not work loose.



Overlap shear action cuts better — saves edge . . . provides non-slip action.



Star chamfer holds rivet from turning — holds jaws in alignment.



Special hardening and precisely machined joints keep needle-nose jaws in line.

Tips for Measuring the Real Work Ability of Pliers

Check the photos above. Shown here are features you have a right to expect in a plier or cutter — features you *get* when you buy SNAP-ON.[®] In addition, SNAP-ON gives you —

Through hardening for extra toughness.

Broached stud-positioning hole for true bearing surface and snug, easy-working joint.

Drilled and reamed rivet holes on needle-nose for easy use.

Broached and ground joint surfaces for smooth operation, snug fit.

Engineered handle design for correct leverage.

Over 60 models and sizes to let you choose the best one for your production or maintenance job.

Your SNAP-ON Sales Engineer can give you more information on the complete plier line. There's a SNAP-ON Branch Office in every major U.S. industrial center.

Or write for catalog listing the complete series, plus full range of wrenches and hand tools.



468 — heavy-duty gripping plier



60R — duck bill plier



387 — high-leverage diagonal cutter



196B — needle-nose plier



951S — electronic gripper cutter



184FC — close-quarter diagonal cutter

SNAP-ON TOOLS
CORPORATION
8033-I 28th Avenue • Kenosha, Wisconsin

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- ☐ REDUCE COSTS
- ☐ SIMPLIFY ASSEMBLY
- ☐ IMPROVE APPEARANCE with

GRC FASTENERS

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& MOLDED NYLON

now! WASHER BASE
WING NUTS
from GRC STOCK



Integral wide-diameter washer base eliminates need for separate washer. Cuts your cost, saves assembly time and labor. Specially suitable for use with bolt holes, adjusting slots, soft surfaces. Holds better because of greater seating area. 14 thread sizes—#6 thru 3/4". GRC—world's most complete stock of standard and special wing nuts.

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Wing Nuts



Cap Nuts



Thumb Nuts



Thumb & Wing Screws



MOLDED NYLON

Screws



Hex Nuts



Washers



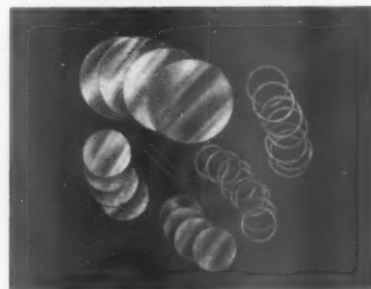
Screw Insulators

able in thicknesses from 0.003 to 0.060". Other sizes of CDF Teflon Tapes are available on special order.

Continental-Diamond Fibre Corp., Newark, Delaware.

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SOFT SOLDER PREFORMS IN ALL SIZES, SHAPES



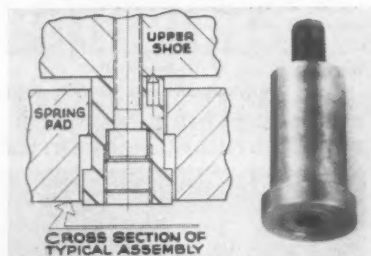
Soft solder preforms in a range of solder alloys up to 700° F melting point, come in discs, washers, spheres and special shapes made to specifications.

Preform discs are held to within plus-or-minus .0002" on diameters with flatness held to within .0002" T.I.R. Spheres range from .001" diameters to .125" diameter with tolerances held as close as plus-or-minus .0001". Washers range in diameters from .025" O.D. to 2.00" O.D. with diameters guaranteed to within plus-or-minus .00025" and thicknesses up to plus-or-minus .0003".

Accurate Specialties Co., Inc., 37-11 57th St., Woodside 77, N.Y.

Use postpaid card. Circle No. 51.

HIGH TENSILE STRENGTH DIE PAD RETAINER SPOOL



A die pad retainer spool reduces die pad failures during production by strengthening the junction between the pad and die shoe.

Large body diameter of the die pad retainer spool provides good footing. Side contact with the large head provides ample contact area to withstand constant pounding of the spring pad. An indent pin keeps the retainer spool from rotating in use. There are no sharp undercuts to start a fracture.

The retainer spool is cyanide hardened for good wearing characteristics. The cap screw head is held in place by a socket set screw. Both heads use the same hex-key wrench size for quick tool change. Models with load carrying values from 900 to 3,000 lbs. are available.

Jolico Industries, 6345 Balfour Ave., Allen Park 10, Mich.

Use postpaid card. Circle No. 52

Exciting new best seller! Yours FREE!

Wilton's new "book"
is more than a catalog!



It's actually a production know-how manual that shows you in-plant photos and operating case histories of how Wilton clamping tools (both manual and powered) have been used by the best brains in the business to save production time and money. Of course we show our line, and that too is unique—Wilton has the most complete line of clamping tools in the world. Write for your copy now; it's an education that will pay dividends in your plant. No obligation, of course.

WILTON

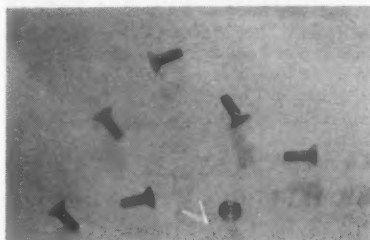
Wilton Tool Manufacturing
Co., Inc.
SCHILLER PARK, ILLINOIS

Canadian Address: 178 Norseman St.,
Toronto, Ontario

APE 99

Use postpaid card. Circle No. 249

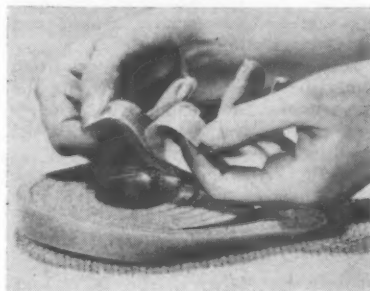
MINIATURE BUTTON-HEAD SOCKET SCREWS STOCKED



Miniature button-head socket screws are now being offered as stock items in the Dyna-Mite line. They are available with either standard hex or spline sockets in alloy or stainless steel. Recommended for resistance to shock and vibration, the button-head socket screws are available in sizes No. 0 through No. 3.

The Bristol Co., Waterbury 20, Conn.
Use postpaid card. Circle No. 53

PLASTIC FOAM ADHERES TO ANY SURFACE



A pressure sensitive polyurethane plastic foam adheres to any surface after removal of backing sheet.

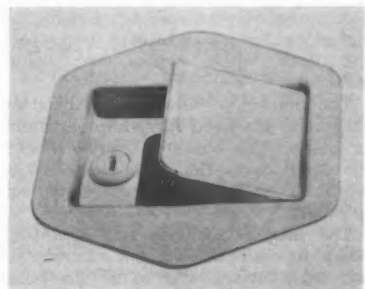
One third as heavy as rubber, Air-O-Seal is said to have insulation properties twice that of cork, excellent resiliency with minimum compression set and resistance to temperature extremes. In some applications dual tracks can be provided to feed and stake or assemble two parts simultaneously into the one assembly.

It is being used to cushion, seal, absorb shock and vibration.

Air-O-Plastik Corp., 310 17th St., Union City, New Jersey.

Use postpaid card. Circle No. 54

PADDLE HANDLE DOOR LOCK WITH SAFETY FEATURE



A door lock designed primarily for use on truck bodies or metal cabinets can be spot welded or bolted into place.

NOWHERE IN THE WORLD WILL YOU FIND SUCH A VARIETY OF FASTENERS UNDER ONE ROOF

EYELETS, RIVETS, GROMMETS, WASHERS, HOLE PLUGS
SNAP FASTENERS, FERRULES, TERMINALS, STAMPINGS

and many similar fasteners are made in enormous variety and quantity. Made from most any metal and in all finishes. We also make a complete line of machines for attaching eyelets, rivets, etc.

Send for our general catalog which illustrates over 1000 metal articles.



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BROOKLYN 5, N.Y., U.S.A.

COMPANY.

BROOKLYN 5, N.Y., U.S.A.

84 FRANKLIN AVENUE, BROOKLYN, N. Y.

Use postpaid card. Circle No. 250



STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

This die head is unique

THERE IS NO OTHER LIKE IT

It cuts threads with insert chasers. These are, in reality, small sections of the business end of large and expensive chasers, but with this important difference: *their cost is so low they can be even thrown away when dull.* For example, for approximately \$50 you can get a dozen sets of insert chasers, each set ground ready to go. Change now to insert chaser die heads and watch your performance improve. "UNIFIED AND AMERICAN SCREW THREAD DIGEST."

THE EASTERN MACHINE SCREW CORPORATION, 25-48 Barclay St., New Haven, Conn.

Use postpaid card. Circle No. 284

HIGH PRODUCTION

Multiple Operations

on a great variety of small parts

... with a single feeding

BECO Multi Spindle Machines

perform various combinations of drilling, tapping, pointing, hollow milling, etc., either on one end or on both ends of the part, at high speeds, and they are completely automatic. We will gladly quote you actual production figures from your drawings.

BATCHELDER ENGINEERING CO.

Springfield, Vermont



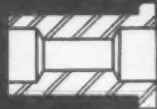
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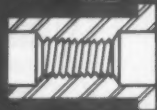
DRILL



DRILL THRU



COUNTER BORE



TAP

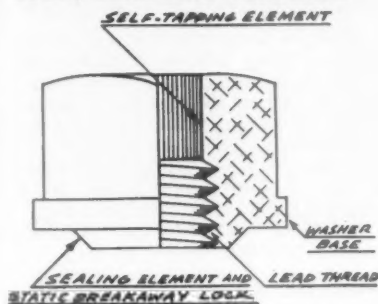
Use postpaid card. Circle No. 285

The Podl-Lock has a flush paddle handle which tells at a glance whether or not the door is securely locked. If the paddle handle protrudes it indicates the door is not securely closed. It is thinly designed and is used universally on either left or right hand doors.

Podl-Lok Co., 1530 Wood St., Oakland 7, California.

Use postpaid card. Circle No. 55

SELF-TAPPING NYLON NUTS LOCK, SEAL AND INSULATE



Nylon self-tapping hexagonal nuts are said to have locking, sealing and insulating features.

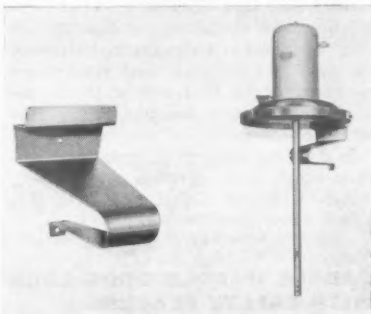
Brilok stop nuts lock at any position along the shank of the screw. As the screw turns into the resilient nylon, a counter-compressive force is built up, resulting in a tight friction lock.

Further tightening will cause the cone at the base of the nut to extrude into the clearance spaces. This forms a highly effective seal against liquid or gas escape, or the entrance of corrosive influences.

Byrd Plastics, Inc., 2953 W. 12th St., Erie, Pennsylvania.

Use postpaid card. Circle No. 56

WALL BRACKET HOLDS LUBE PUMP AS DRUMS CHANGED



A pump support wall bracket is designed to hold a lubricant pump off the floor while drums are being changed.

The bracket, of 16-gauge sheet steel eliminates the need for pump elevators or hoists. The operator merely hooks the drum cover flange on the bracket while he slides in a fresh drum of lubricant.

The bracket includes two mounting holes, top and bottom, for securing to any type surface with 5/16" dia. bolts or screws.

Lincoln Engineering Co., 5799 Natural Bridge Ave., St. Louis 20, Mo.

Use postpaid card. Circle No. 57

LOW HEIGHT WING NUTS ELIMINATE SNAGGING



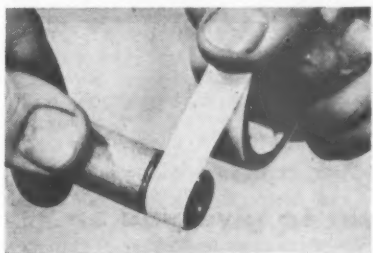
Zinc alloy wing nuts are designed for use where low wing height is needed or where the projection of a standard wing nut might introduce a snag problem.

The die cast nuts are supplied in thread sizes from No. 5 through $\frac{3}{8}$ " and in wing spreads of 13/16" through 1". They are also available as specials with blank modifications to solve specific application problems.

The rust-proof fasteners feature recessed wings for extra finger grip and integral bases. Threads are class 2B.

Gries Reproducer Corp., 125 Beechwood Ave., New Rochelle, N.Y.
Use postpaid card. Circle No. 58

TEFLON PLASTIC TAPE SEALS THREADED JOINTS



Plastic tape made from Teflon seals threaded pipe joints.

Advantages are said to include: fast application (just wrap once around thread and tear off), no dripping or splattering, unaffected by temperatures from -250° to 500° F and does not harden after application, permitting easy disassembly.

Tape-Seal does not "ride up" as pipes are joined, but instead lubricates joint and makes application easier. Samples.

Friesland Plastics Co., Friesland, Wis.
Use postpaid card. Circle No. 59

NON-STAINING PRINTED CIRCUIT DRAFTING TAPE

Extra narrow black pressure sensitive photographic tape with clear adhesive is available in widths from 1/64" and up to any fraction of an inch in 15 and 60 yard rolls.

These tapes are backed with clear, non-staining adhesive and are ideal for use in making printed circuit master layouts or for draftsmen who have special shape conductors or pads to form.

By-Buk Company, 4314 W. Pico Blvd., Los Angeles 19, Calif.

Use postpaid card. Circle No. 60



High Output Low Tool Cost SCREW SLOTTING

DEMONSTRATING NOW

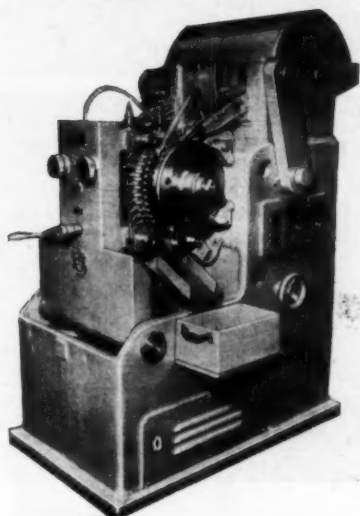
Phone CL 2-7081

for an appointment.

★ 1,000,000 PIECES PER TOOL
GRIND

★ UP TO 1,000 PIECES PER
MIN.

★ FAST SET-UP TIME



Model asm 6 with 2x10 slotting tools shown.

These famous German built machines feature:

- NEW DESIGN—no saw—10 knife blade cutters in steel holder—easily adjustable by simultaneously swinging all cutters to slot depth
- GRINDING FIXTURE—sharpens all 10 cutters at once on a standard surface grinder
- BURR FREE SLOTTING—of any type screw head
- INDIVIDUAL CLAMPING OF EACH SCREW—eliminates tool breakage, gives more accurate slots
- DOUBLE HOPPER AND TWO TRANSPORT DISKS—two different type screws can be slotted simultaneously
- Special design machines available

SOLD AND SERVICED IN U.S. AND CANADA BY

The BOLTMASTER Co.

Exclusive importers of German Craftsman Peltzer & Ehlers Machinery—builders of machinery for the Bolt Industry since 1888

5306 WEST 130th STREET

CLEVELAND 30, OHIO

Use postpaid card. Circle No. 253



Size 834 on
heavy machinery assembly
NEW 25% more output... for
\$1250 Dividend Dollars/year.



Size 808 on
foundry flask assembly
NEW 20% more output... for
\$1000 Dividend Dollars/year.



Size 804 on
Mailing Machine Assembly
NEW 40% more output... for
\$2000 Dividend Dollars/year.



Size 5020 on
electric motor assembly
NEW 10% more output... for
\$500 Dividend Dollars/year.

4 NEW IMPACTTOOLS

NEW designs

NEW speeds

NEW power to give you an

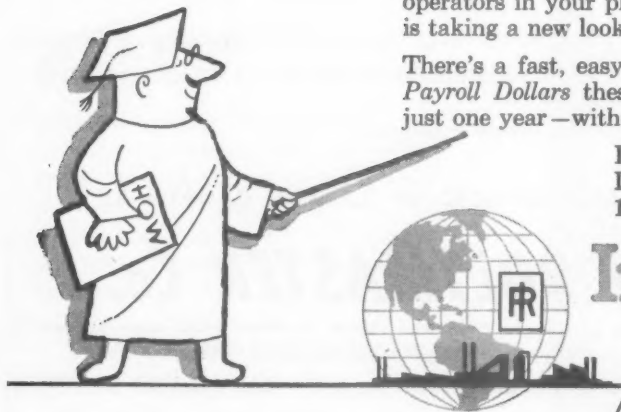
ANNUAL DIVIDEND on your PAYROLL DOLLARS

If your operators are using older model Impacttools, you can increase their man-hour productivity by as much as \$2000 Payroll Dollars in one year, just by replacing the older tools with one of the 4 new I-R designs.

Multiply these *Annual Dividends* by the number of Impacttool operators in your plant, and you can see why management today is taking a new look at portable tool operations.

There's a fast, easy way to calculate the amount of *Dividend on Payroll Dollars* these new I-R Impacttools can help you earn in just one year—without adding to your present payroll.

It's yours without obligation. To get it, call your I-R AIREngineer today. Or write Ingersoll-Rand, 11 Broadway, New York 4, N. Y. 8-920



Ingersoll-Rand

11 Broadway, New York 4, N. Y.

Tools plus AIREngineering
increase output per man

Use postpaid card. Circle No. 254

USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 66.

SETS RIVETS, CLINCH NUTS

Machines which automatically feed and set parts, inspect and eject components are the subject of eight-page Bulletin 555. Seven machines either handling rivets or clinch nuts are pictured and specified with recommended applications. The four steps in a Rivetor's action are shown in sequence. The Tompkins-Johnson Co., Jackson, Michigan.

Use postpaid card. Circle No. 63

STAPLING FOR ELECTRONICS

Stapling equipment designed for electronics assembly is pictured and described in a 16-page catalog. A power binder for circuitry, lug applicator and machine for coils and collar work are included among models for general sheet work. Acme Staple Co., 1643 Haddon Ave., Camden 3, N. J.

Use postpaid card. Circle No. 64

ANGLE ATTACHMENTS

Angle attachments for portable tools are cataloged in a 36-page booklet. A page is devoted to each attachment with a dimensional drawing pointing out the nomenclature of each assembly, descriptive text, suggested use and prices of both the unit and replacement parts. Monument Engineering Co., Inc., 1625 Bellefontaine, Indianapolis, Indiana.

Use postpaid card. Circle No. 65

CASE HISTORIES

More than a dozen widely varied stud welding applications, which have enabled manufacturers to reduce their fastening costs from 30 to 60%, are shown in a 12-page booklet on "Reversing the Trend in Production Costs". The booklet includes a cost reduction work sheet to enable the reader to compute savings obtainable by stud welding on specific fastening operations. Examples range all the way from giant wind tunnel compressor stators to small

power tools and air-conditioning equipment. Nelson Stud Welding, Lorain, Ohio.

Use postpaid card. Circle No. 66

FASTENING DEVICES

Information on a varied line of fastening devices is detailed in six-page Form ASC-559. Plastic expandable screw anchors for use in any material, a new combination nailstrap for handling cable, pipe tubing, wire connectors, toggle bolts, masonry drills and allied products are illustrated, specified and priced. Holub Industries, Inc., Sycamore, Illinois.

Use postpaid card. Circle No. 67

CHOOSING LOCK WASHERS

How to choose the right lock washer for a specific job is pointed out in a two-color, 31-page catalog. Fifteen types of standard and special lock washers are specified, with pictures of typical applications for each and actual-size illustrations of the more popular washers. Shakeproof, St. Charles Rd., Elgin, Illinois.

Use postpaid card. Circle No. 68

EXACT COUNT PACKAGING

An electronic device counts up to 10 gross per minute of parts on the Model 628 exact count package filling machine. A four-page brochure pictures and describes the automatic machine: box size range, hopper feeder, various speed flows, specifications. Batchelder Engineering Co., Springfield, Vermont.

Use postpaid card. Circle No. 69

A.S. ON MINIATURE SCREWS

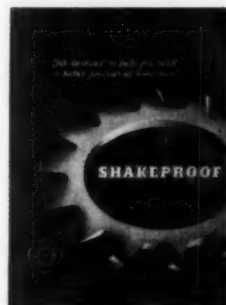
"American Standard Unified Miniature Screw Threads, B1.10-1958" has been approved by the American Standards Association and published by ASME. The publication establishes 14 standard screw thread sizes, with a standard design. The series covers a



(See 63)



(See 64)



(See 68)

diameter range from .30 to 1.40 millimeters. \$1.50. ASME, 29 W. 39th St., New York 18, N.Y.

Use postpaid card. Circle No. 70

500 STAMPED PARTS

Lugs, clips, terminals and hundreds of other standard parts are illustrated in sketches and plan drawings in a 58-page Catalog 22. Special stampings and wire forms are also available from samples, sketches or blueprints. Parts are hot tinned for easy soldering. Zierick Mfg. Corp., 110 Beechwood Ave., New Rochelle, N. Y.

Use postpaid card. Circle No. 71



UNUSUAL ASSEMBLY TOOLS

Samples of six unique, custom-designed hand tools for assembly work are exhibited and the service for creating new tools is outlined in a four-page brochure. A geared right-angle tool that reaches around corners, snap torque wrenches, a replaceable-tip snap ring tool and a wire twister for one-hand operation are shown. Milbar Corp., 1900 Euclid Ave., Cleveland 15, Ohio.

Use postpaid card. Circle No. 72

BLIND BOLTS

Bolts for blind applications are described in four-page illustrated Form 8-389. Features of the Tau bolt, specifications for both protruding head and countersunk head designs, dimensional drawings and hole specifications are included. Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Mich.

Use postpaid card. Circle No. 73

COLOR CODING PARTS

"How to Color Code Plastic Parts at Low Cost" explains applications of the Colorite dyeing process of plastics for color coding, prototypes, and special effects. One panel of the brochure contains a listing of various plastics, their trade designation, and the Colorite process that can be applied to the material. The method of color coding when utilizing "family" molds with their inherent economies by using the Colorite process is also discussed. Colorite Industrial Dyers, 244 West 38th St., New York 18, N. Y.

Use postpaid card. Circle No. 74

PLIERS FOR ELECTRONICS

Standard and custom drop-forged pliers for the electronic industry are pictured and described in six-page Form A6-1. Thirty-six different models designed for precision assembly functions are covered. Price list included. Utica Drop Forge & Tool, Utica 4, N.Y.

Use postpaid card. Circle No. 75

COLD HEADED FASTENERS

Fasteners cold-headed and formed, heat treated and plated to specifications, is the service outlined in a four-page, two-color brochure. Parts in carbon or alloy steel, stainless, aluminum, brass and bronze are available. Self-tapping screws are a specialty. Quality Fasteners, Inc., Box 748, Kalamazoo, Mich.

Use postpaid card. Circle No. 76

RIVET SETTERS

Automatic rivet-setting machines Models B and S are shown in operation and specified in four-page Bulletin No. 1012. Working heads are removable and interchangeable for various rivet types. Bench and floor models shown. National Rivet & Mfg. Co., Waupun, Wis.

Use postpaid card. Circle No. 77

SELF-THREADING NUTS

An eight-page bulletin gives data on line of nuts which form their own threads while tightening on studs of any malleable materials, including zinc and aluminum die-cast; also on rods, wire and pins of steel, aluminum, brass or plastic. Includes engineering and assembly data, torque-tensile factors. The Painot Company, 79-L Glen Rd., Mountainside, N.J.

Use postpaid card. Circle No. 78

1600°F BOLTS

Aircraft bolts for working temperatures to 1600°F are described in four-page Form 2484. Photos of typical airframe (EWB 1615) and engine (BE 1615) series bolts are shown. Both series have external-wrenching, 12-point head configurations. Both are fabricated from one of four advanced metal alloys—either M-252, Waspalloy, Udimet 500 or Hastalloy R-235. Charts, graphs, test reports, supplement the text. Standard Pressed Steel Co., Box 1121, Jenkintown, Pennsylvania.

Use postpaid card. Circle No. 79



DRAFTING ROOM FURNITURE

Tracing files, drafting tables, stools, and chairs of steel and wood are pictured and specified in 16-page Catalog DFI-156 and 36-page Catalog ADR-503. Features of all models are outlined in cutaway drawings. Frederick Post Co., 3650 N. Avondale, Chicago, Illinois.

Use postpaid card. Circle No. 80

PARTS FEEDERS

Vibratory feeders designed for fingertip control and low maintenance feeding are described in a well-illustrated 32-page catalog. Thirteen light and heavy duty electro-magnetically vi-

brated feeders are specified. Typical installations pictured. Syntron Co., 820 Lexington Ave., Homer City, Pa.

Use postpaid card. Circle No. 81

MOUNTING ANGLE-CLAMP

Versa-Loc angle and clamp is used for building, mounting, supporting, holding or clamping. The structural system is detailed in a four-page brochure and insert with typical applications, features and technical data. Versa-Loc Corp., Southern Blvd., Chatham, New Jersey.

Use postpaid card. Circle No. 82

AIRCRAFT PARTS

Purchasing agents and production men in the aircraft, missile and avionic industries will be interested in a four-page blueprint facsimile outlining the nomenclature of a special nut and bolt. Unique brochure illustrates types of fasteners manufactured and lists low to high temperature materials used. Mercury Air Parts Co., 9310 W. Jefferson Blvd., Culver City, Calif.

Use postpaid card. Circle No. 83



EYELETS

Eyelets for electronic and other uses are cataloged in 28-page, two-color Publication BG-1. Dimensional drawings are accompanied by easy-to-read columns of specifications. Seamless base pins are also supplied. Fabricated Metal Goods Div., The American Brass Co., 26 Crane St., Waterbury 20, Conn.

Use postpaid card. Circle No. 84

BOLTS, THREADED RODS

An illustrated catalog and price list on stud bolts and threaded rods is divided into nine sections, and lists nearly 10,000 sizes, diameters and lengths in commonly used metals. Tap end, double end and continuous thread stud bolts are discussed. ASTM specifications, chemical composition, hardness and tensile requirements are set forth. R.E.C. Corp., Cedar St., New Rochelle, N. Y.

Use postpaid card. Circle No. 85

PARTS ESCAPEMENT DEVICE

A data sheet describes parts escapement device designed to automatically effect the timed release of parts being fed through chutes. The illustrated sheet gives specifications for air or solenoid operated escapement, which is adjustable for use with different parts or on different chutes. Syntron Co., 820 Lexington Ave., Homer City, Pennsylvania.

Use postpaid card. Circle No. 86

SEALING DRILLED HOLES

Engineers will be interested in pin plugs which seal drilled holes. How the cylindrical plug with a tapered, reamed hole partway through its center and small grooves on its outside surface has solved design problem is told in eight pages of data. Test charts, specifications, application information. Lee Co., Westbrook, Conn.

Use postpaid card. Circle No. 87



MACHINED BRASS NUTS

A colorful 12-page brochure illustrates a line of machined brass nuts. The nuts are said to meet American Class 2, 2B and 3B tolerances. Engineering specifications, features, ordering information on machine screw nuts, A.S. hex nuts, cap and open cap nuts, eyelets, knurled thumb nuts and others. Cornell Mfg. Co., Inc., 21B Saw Mill River Rd., Yonkers, N. Y.

Use postpaid card. Circle No. 88

SCREW MACHINE PRODUCTS

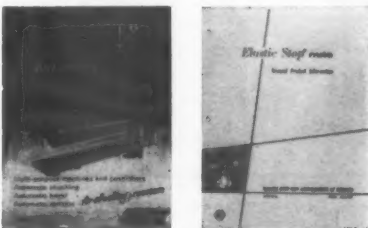
A four-page, file-holder brochure is filled with photographs showing the facilities for manufacturing screw machine products. Machines are illustrated and listed and an "A to Z" listing of production items is given. Western Machine Co., 180 W. Holt Ave., Milwaukee 7, Wisconsin.

Use postpaid card. Circle No. 89

AUTOMATIC WELDING

Machinery for automatic welding is featured in four-page Bulletin 5-12-57. Planishing, circumferential and longitudinal machines and positioners with automatic chucking, travel and ejection are discussed. Photos of many models. Airline Welding Sales, Inc., 750 N. Prairie Ave., Hawthorne, Calif.

Use postpaid card. Circle No. 90



MINIATURE NUTS

A 32-page illustrated catalog (No. 5711) presents latest designs and configurations in miniaturized self-locking fasteners for assembly of electronic and avionic equipment. Charts offer visual comparisons of size relationships between standard AN parts and the current NAS miniature nut standards.

The catalog includes 18 pages of detailed standard drawings of the various miniature hex, clinch, and floating anchor nuts. Dept. M, Elastic Stop Nut Corporation of America, 2330 Vauxhall Rd., Union, N. J.

Use postpaid card. Circle No. 91

SCREW THREAD CHART

Engineers, inspectors and purchasing agents will want a wall or desk chart showing all details for Unified and American External Screw Threads with diagrams showing the terms for ordering, produced on heavy 5 ply, white board 8 1/2" x 11". All specifications (0.060" thru 1.0") as well as thread symbol, allowance, max and min diameters, max and min pitch diameters, etc., are all on the one card. Figures large and readable. Request on Company letterhead from The Ohio Rod Products Co. 20259 First Ave., Berea, Ohio.

Use postpaid card. Circle No. 92

ALUMINUM BLIND RIVETS

MS aluminum self-plugging blind rivets are outlined in four-page Form 8-457. Typical applications are illustrated with cross-section drawings. Protruding and countersunk head styles are shown, with technical data on shear and tension values, materials, hole sizing and grip range information. Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Michigan.

Use postpaid card. Circle No. 93



SET-UP TOOLS

Component parts for jigs, fixtures and special machinery are specified in 18-page Catalog 28. Clamps, V-Pads, knobs, screws, keys, studs, nuts are illustrated and sized. A selection chart lists parts appropriate for most machine tools by brand. Northwestern Tool & Engineering Co., 117 Hollier Ave., Dayton 3, Ohio.

Use postpaid card. Circle No. 94

RESISTANCE SOLDERING UNIT

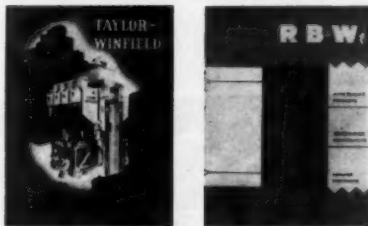
Three models of resistance soldering units for assembly line soldering, and 10 types of soldering probes are described in Catalog K-3. Development of precision soldering technique through use of electronically timed MicroBrazers is explained and illustrated. Use of manually operated 100-watt and 1000-watt MicroBrazers for light and heavy duty soldering and brazing is detailed. Zephyr Mfg. Co., Inc., 201 Hindy Ave., Inglewood, Calif.

Use postpaid card. Circle No. 95

AUTOMATIC WELDERS

Custom designed multi-spot and projection welding machines are outlined in a 10-page Bulletin 8-413. Twenty different resistance welders are pictured and described by product, operation, production rate and brief specification. Specialize in automotive and appliance industries. Taylor-Winfield Corp., Warren, Ohio.

Use postpaid card. Circle No. 96



HIGH TENSION FASTENERS

Nuts and screws with integral flanges offer a high tension to torque ratio, aided by locking action of ratchet-like teeth under the head. Tensilock fasteners are discussed in an eight-page catalog which also presents cold-headed specials, welding parts, place bolts, standard lock nuts, sealing construction screws. Russell, Burdall & Ward Bolt and Nut Co., 101 Midland Ave., Port Chester, N. Y.

Use postpaid card. Circle No. 97

ASSEMBLY WORK BENCHES

A six-page bulletin describes modular assembly benches which are not limited to fixed dimensions and which are made from standard catalog parts. Products For Industry, Inc., 1530 Summer St., Stamford, Conn.

Use postpaid card. Circle No. 98

WELD FASTENERS

Projection welding parts, both standard and special, are listed by type, size, head diameter and head height in an eight-page bulletin. Screws, studs, pins and nuts for fastening to materials .030 to 1/4" thick are pictured and specified. The National Screw & Mfg. Co., 2440 E. 75th St., Cleveland 4, Ohio.

Use postpaid card. Circle No. 99



STUD WELDING

Stud welding is introduced in Form G-1 while an accompanying brochure expands into automatic production units for the method of arc welding fasteners to sheet metal. Cost-cutting features of the portable gun models are pointed out through photos. Nelson Stud Welding, Lorain, Ohio.

Use postpaid card. Circle No. 100



Pioneers in the Manufacture of
**COLD HEADED
 FASTENERS**

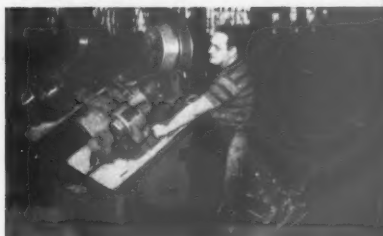
standard and special shapes and sizes **SLOTTED • PHILLIPS • SEMS** all head styles, metals and finishes



COLD HEADING



PLATING



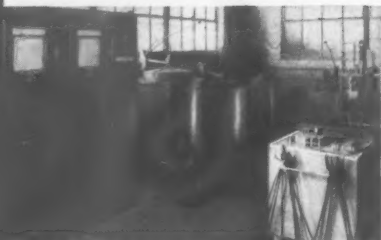
SLOTTING



DRILLING—TAPPING



THREAD ROLLING



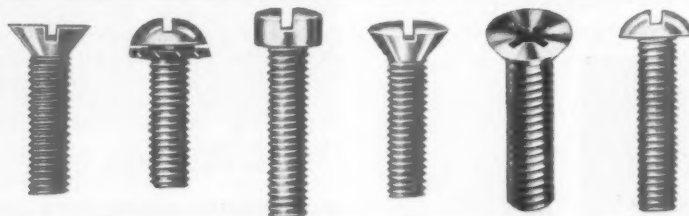
HEAT-TREATING



TURNING—POINTING

The facilities and services behind a product often help to confirm claims of quality. Here at Hubbell we have the equipment to produce the finest metal fasteners: machine screws, rivets, studs, etc. We will gladly put this equipment to work for you.

Standards, Specials, Miniatures ... whatever you need, we will gladly estimate.



In conjunction with our modern production methods, Hubbell's engineering facilities are available to you for any design or fabrication problem.

Harvey Hubbell, Incorporated

Machine Screw Department



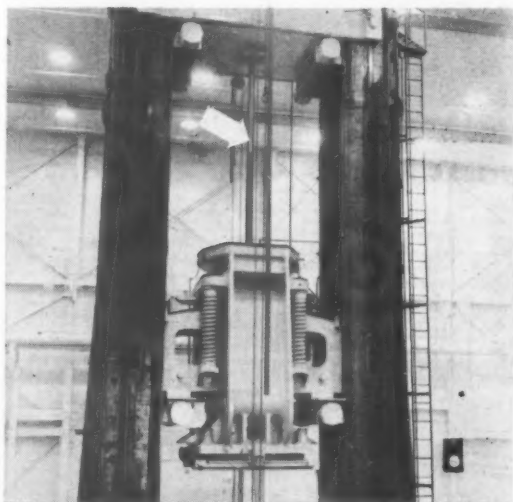
Bridgeport 2, Conn.

Use postpaid card. Circle No. 255

INDUSTRY MAKES NEWS



Admiring a 165 lb. ratchet wrench at the Lowell Wrench Co. are Mrs. Anna M. Greene, treasurer, H. S. Cummings, general manager (in front) and Worcester, Mass. officials.



A 14-foot jack screw (arrow) is one of 64 made by SPS for use in leveling two 5-story Arctic radar buildings. Screw is being tested under more than 800 tons of tensile load.

LOWELL WRENCH MARKS TWO BIG EVENTS

A ribbon cutting ceremony and plant tour of its new building was combined with the celebration of its 90th anniversary by the Lowell Wrench Co., Worcester, Mass.

City officials, local industrial leaders and employees joined in the commemoration.

On display were some of the company's first wrenches manufactured in 1869, together with their modern counterparts. Also shown were many of the unique wrenches made today, with features such as hinged handles, non-sparking bronze, light-weight aluminum and end-of-handle reversing knob.

A.W.S. FALL MEETING IN DETROIT

The American Welding Society fall meeting will be held in the Sheraton-Cadillac Hotel, Detroit, Sept. 28 through Oct. 1, 1959. Sixteen sessions will be held and a total of 48 technical papers will be presented. AWS headquarters are at 33 W. 39th Street, New York 18, N.Y.

GIANT JACK SCREWS SERVE ON DEW-LINE

Giant jack screws, each 14 feet high and 5 inches in diameter, will be a key part of the unique means of lifting and leveling radar buildings and radomes of the two new Distant Early Warning (DEW) Line stations being built on the Greenland icecap this summer.

A total of 64 of the long threaded columns with mating lifting nuts and jam nuts have been produced for this purpose and shipped by Standard Pressed Steel Co., Jenkintown, Pa., on order from Perfecting Service Co., Charlott, N.C., designers and manufacturers of the lifting and leveling system.

The mechanical leveling system will be called into play whenever the radar facilities tilt out of level. The jack screws—32 of them to a DEW Line station—together with related hydraulic and electric systems will compensate for the shifting footing afforded by the frozen icecap with changes of temperature. The stilt-like supports will also raise and lower the five-story buildings to maintain a 15-foot clearance with the ground, despite varying accumulations of snow.

continued

Each jack screw can sustain a load of more than 800 tons. The 32 jack screws at each station will support a five-story building atop of which will be a radome-enclosed 60-foot diameter radar antenna.

The jack screws will be anchored in footings surrounding the circumference of the radar site. The framework of the building will be connected to the 32 lifting nuts that run up and down the threaded portions of the jack screws. At the push of a button, the system will automatically level the building whenever things get out of kilter.

The 1000-pound screws were each tensile tested to withstand a straight pull of 1,600,000 lbs., or 90,000 lbs. psi.

The studs were machined by SPS out of heat-treated ASTM grade (4340-type) alloy steel bar. Lift nuts were made from bronze-aluminum-manganese castings. Some of the studs were precision threaded for as much as seven consecutive feet.

NEW OFFICES FOR AMP WESTERN DEALER

Peters-de-Laet, distributors of AMP terminals for the western states, will expand into a new home office and distributing point at 1606 Rollins Rd., Millsdale, Calif. Covering 10 states and Hawaii, the firm has grown from a \$30,000 sales volume in 1947 to over \$1 million.

TOWNSEND TRANSFERS TOOLING SPECIALIST



Expansion of services for the aircraft industry has been announced by the Cherry Rivet Division, Townsend Co., Santa Ana, Calif., with the appointment of Frank S. Scott to the technical sales department as a tooling specialist.

With 25 years with Townsend, Scott has spent the last six years in Cleveland and the New Brighton, Pa. home office. He has served as manager of the Chicago plant.



ATTRACTING ATTENTION at The Robert E. Morris Co. tool show is this European-built miniature parts header. Discussing its merits are (left to right) Michael Hart, supt. of the heading dept. of Harvey Hubbell, Inc.; Walter and Robert Morris, sponsors of the show; and Mrs. Earle H. Tuttle, owner of Crescent Mfg. Co.

SALES APPOINTMENTS AT STANLEY-HUMASON

Edward J. Herens has been appointed manager of sales service and Robert Johnson has been named sales engineer for Stanley-Humason, Inc., of Forestville, Conn., a subsidiary of The Stanley Works.

Herens will be responsible for customer service and pricing. He has been with the company for 33 years. Johnson has spent six years working as a draftsman and tool designer.



SPECIAL FASTENERS

ANCHOR

Fasteners, Inc.

Representatives in New York City • Syracuse • Baltimore • Philadelphia • Cleveland • Cincinnati • St. Louis • Chicago • Detroit • Fort Wayne


Plants and Offices: Waterbury, Conn., Plaza 6-3617... TWX 165
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Formerly Connecticut Screw & Rivet Co., Inc.

CUSTOM DESIGNED To Lower YOUR Assembly Costs

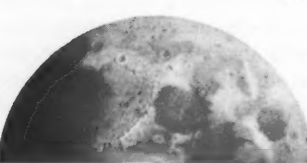
- CLIPS DESIGNED & MASS PRODUCED TO ORDER — One-Piece Or Assembled; Special Stampings; With Or Without Sealers — For Automotive, Appliance, Electrical, Furniture, Hardware & Other Volume Users
- COMPLETE FASTENER LINE — All types of screws — Sems — Spinlocks — special cold headed products — Keps® — nut and washer assemblies — hollow stamped nuts — clips
- FASTENER ENGINEERING SERVICE — By Anchor's nationally recognized experts

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21 YEARS

SERVING THE AVIATION
INDUSTRY



BOOTS

AIRCRAFT NUT CORPORATION

NORWALK, CONN.

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BOLTS 'N NUTS FROM REPUBLIC



"Duncan, this inverted design makes spillage nearly 100% impossible. However, I have faith in your doing the impossible." — Adv. Republic Steel

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Assembly and Fastener Engineering

PARKER-KALON NAMES REGIONAL SLS. MGRS.

William Conover has been promoted from field sales engineer to regional sales manager, with headquarters in the Chicago office. He will be directly responsible for field sales management in Illinois, Indiana, Missouri, Kansas, Iowa, Wisconsin, Minnesota, Nebraska, and North and South Dakota.

Conover received his Bachelor of Science degree in Mechanical Engineering from the Chicago Technical College, and also attended DePaul University and the University of Denver. He served in the U.S. Navy during World War II.

Gilbert Harrell has been promoted from field sales engineer to regional sales manager by Parker-Kalon Div., General American Transportation Corp., Clifton, N. J.

Harrell will make his headquarters in Cleveland and cover the North Central States, including up-state New York. He has served the states of Tenn., Texas, Okla., and Ark. since joining the company in 1954.



CONOVER



HARRELL

FASTENER PRICING SIMPLIFIED BY RB&W

A major program of pricing simplification has been initiated by Russell, Burdick & Ward Bolt and Nut Co., Port Chester, N. Y. The new system uses product lists with simple discounts.

"While the new price lists and simplified discount pattern reflect definite changes from the previous market, they recognize competitive conditions in certain areas and are designed to take the work out of pricing and billing and to solve some of the fastener user's buying problems," John S. Davey, vice president, said.

HIGH SPEED equipment for better production, lower cost

RIVETING HAMMERS

Available in 10 sizes. Handle full range of work up to 2" diameter solid rivets. Quick to set up or change tools. Available in bench and pedestal models. Backed by finest, most complete tooling service in the industry.



NOISELESS RIVET SPINNERS

Motor-driven, noiseless, rugged. Spindle travel adjustable. Fast cycle. Produces absolutely uniform assemblies. Model E (capacity 1/8") and Model G (capacity 5/16") available in both bench and pedestal models, foot or AIR operated.



ELECTRIC SOLENOID PUNCH

Stakes, rivets, marks, cuts off, bends, crimps, etc. with positive alignment. 4 1/2" maximum vertical opening (2 1/4" minimum for tools and work). 1 1/4" spindle travel, adjustable downward. Fast cycle. 3500-lb. impact. Single or dual, hand or foot control.



AUTOMATIC STAKING MACHINES

Pressure pad built into spindle firmly secures work before blow. Allows for variation in thickness. Delivers uniform blow every time. Quick, easy adjustment, wide power range. 4 sizes—bench and pedestal models, foot and air operated.



We manufacture the most COMPLETE LINE of assembly machinery on the market today, so generally can recommend the CORRECT TYPE MACHINE for any assembly application.

FREE Assembly Engineering Service

Just send samples or blueprints of parts to be assembled. We'll recommend the right tools, procedure and equipment to use . . . without cost or obligation.

HIGH SPEED HAMMER CO.

308 NORTON ST., ROCHESTER 21, N.Y.

BRAND NEW IDEA

SAVES ASSEMBLY TIME

Low cost hand tool drives any screw with ease . . . in seconds

power egg

RATCHET

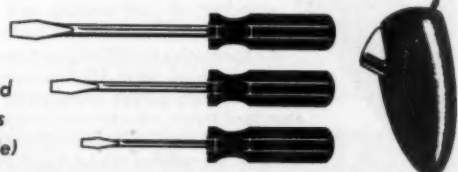
SCREW DRIVER

5 TIMES MORE HAND POWER!

- FIRST BASIC NEW TOOL IN 25 YEARS!
- USE FULL SHOULDER POWER . . . NOT JUST HAND POWER!
- 3 FINEST QUALITY HARDENED STEEL SCREWDRIVERS!

This new plastic egg design and a new engineering principle gives you extra hand power without extra effort that means sore hands and blistered palms you often get with ordinary screwdrivers. Write for prices and information on variety of POWER-EGG kits.

(Phillips head screwdrivers also available)



POWER EGG DIVISION

10252 Berea Road, Cleveland, Ohio

Cuyahoga Products Corporation

A subsidiary of



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September, 1959

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The new lists cover popular products and feature simple discounts. Product classifications have been simplified by use of more descriptive nomenclature and by eliminating many products which have little usage.

VLIER PURCHASES WEST POINT MFG.

Vlier Engineering Corp., Los Angeles, Calif. announced an agreement to purchase certain assets and the going business of West Point Mfg. Co. The acquisition will be operated as the Wespo Division of Vlier.

HUCK NAMES MGR. FOR NEW SALES DIV.



F. F. DeLoach is the new southern division sales manager for Huck Mfg. Co., Detroit, with offices for the newly created division in downtown Atlanta, Ga. DeLoach joined Huck in 1952 as engineering representative in Atlanta, the position he held at the time of his new appointment. His background includes seven years in the U. S. Air Force, a year as pilot and flight engineer with Delta Airlines and two years as senior buyer with Lockheed Aircraft.

OLIVER-FARQUHAR ADDS CONVEYOR ENGIN.

English-trained Richard Jakobi is now conveyor systems engineering specialist with The Oliver Corp., A. B. Farquhar Div., York, Pa.

Jakobi, who will work in developing automated conveying systems, has been working in the U. S. for the last 10 years for several conveyor manufacturers in the midwest and New York. He has assumed his duties at the York, Pa., plant.



ESNA ENGINEERS WIN SWANSTROM AWARDS



Bjorn Swanstrom (center), son of the founder of the Elastic Stop Nut Corp. of America, presents \$1000 merit awards to ESNA engineers R. C. Baubles (left) and K. R. Bronson (right) for work on fastener design.

Keith R. Bronson, head of Research Section, and Richard C. Baubles, project engineer at the Elastic Stop Nut Corporation of America, Union, N. J. were each presented the Carl Arthur Swanstrom Merit Award of \$1000 in recognition of outstanding engineering achievement.

The awards were given for successful development of the ESNATHRED process and a bolt and nut design which greatly increases the fatigue strength of threaded fasteners. The project represents four years of extensive research, design and testing.

HARNISCHFEGGER NAMES WELDING SALES MGR.

Harnischfeger Corp., of Milwaukee, Wis. announced the appointment of Hardwick L. Browne as sales manager, welding products, international division. Browne will operate out of the International Division offices in Milwaukee with complete responsibility for the sale of P&H welding machines, welding electrodes and welding positioners.

AUTOMOTIVE and AIRCRAFT QUALITY screw machine parts with "LOK-THRED"

"LOK-THRED" is self-locking, stronger, non-fretting, self-sealing and economical. Actually improves in service.

We specialize in difficult and complicated screw machine parts. High accuracy prototypes to multimillion production runs. All standard steels, non-ferrous metals or modern aircraft engine metals. Hardened and ground. Complete, modern equipment. Co-operative development engineering service.

Let us demonstrate the many advantages of "LOK-THRED". PHONE PRescott 5-6262.

MAYNARD MANUFACTURING CO.
22755 SHAKESPEARE, EAST DETROIT, MICH.

Use postpaid card. Circle No. 238

THE NEW TITAN "TitanSert" THREADED INSERT or BUSHING DRIVER

... featuring primary and automatic secondary clutches for driving either self-tapping or regular inserts.

Drives inserts to a very accurate position. Selective position is accomplished by a wide-range depth gage on the driver while driver is rotating. Depth gage is ball bearing mounted, eliminating marking of casting face. "TitanSert" has a primary clutch for driving and a secondary positive clutch for reversing out of insert after it is driven. When insert is driven to proper position, the primary (drive) clutch disengages. When the motive power is pulled back to actuate the automatic reverse, the secondary clutch engages, and the "TitanSert" rapidly reverses out of the predriven insert. "TitanSert" can easily be used with a tapping head mounted on an ordinary drill press; or with automatic air or electric tapping motors when provision is made to keep the tool spindle at right angles to face of casting.

Sizes available: No. 1, Cap. No. 10 to 3/8" I.D.; No. 2, Cap. 3/8" to 1 1/2" I.D.

Write for details and price today!

TITAN TOOLS World's Largest Producers Of Stud Drivers And Pullers
TITAN TOOL CO.

47 MAIN ST., FAIRVIEW (ERIE COUNTY), PA.

Use postpaid card. Circle No. 239

Assembly and Fastener Engineering

NEW CENTRAL PLANT IN FULL PRODUCTION

Central Screw Company, Chicago, reports that its new plant in Frankfort, which began operations early in 1958 has now attained full production. The plant is situated on a 30 acre tract and comprises 80,000 sq. ft. of production area. The company announced the appointment of Bryant Procter as divisional sales manager of the Keene, N.H. plant, where he will coordinate sales activities in the eastern states, from Florida to Maine.

CLECO ANNOUNCES SALES PROMOTIONS

E. W. Clayton has been promoted to sales manager of the Cleco division of the Reed Roller Bit Co., Houston, Tex. He was formerly sales development manager. Also, T. E. Donohue, former sales manager, will be general manager of the Cleco Pneumatic Tool Co. of Canada, Ltd.

Two new salesmen for the Chicago area are David J. Richards and Richard O. Erickson. Dan Rini will be factory representative in Cleveland and northwestern Ohio.

TRUARC DIV. REALIGNS SALES FORCE

A major realignment of the sales organization of the Truarc Retaining Rings Div. of Waldes Kohinoor, Inc., Long Island City, N. Y. has been announced.

Mel S. Nielsen, former west coast sales engineer, has been appointed Western Division manager. He will be responsible for the west coast, as well as the southwestern territory covered by Ludwig L. Bluth, who has retired.

Paul W. Vapnek is being transferred from the home office to succeed Nielsen in northern California, Washington and Oregon. Howard Roberts has joined the company's headquarters staff and William W. Curtis, formerly with ESNA, will be handling Roberts' N.J. territory and the south-



NIELSEN



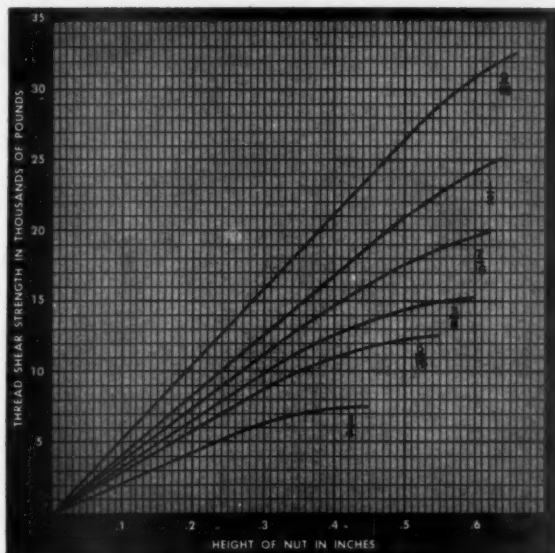
**for all engine applications...*

Special taper LOK-THRED[®] assures perfect fit—will not seize. Six standard pipe sizes. Ideal for use in aluminum and other non-ferrous metals. Write for samples and additional information.

Pittsburgh Plug and Products Corporation
P. O. Box 304 Evans City, Pa.

Use postpaid card. Circle No. 260

September, 1959



Shear Strength...

Finished HEXAGON NUTS
fine and coarse threads

The above curves show the shear strength of a nut (the load causing the threads to strip) varies with its height. (The curves do not account for bolt characteristics or fatigue and safety factors.)

If you are buying load carrying capacity, the curves suggest that it may be more economical to:

1. Use a thicker nut—
2. Increase the fastener size—
3. Use more and smaller fastenings—
4. Use heat-treated nuts to develop full bolt strength (heat-treating increases nut proof load 30 to 50% over the above values)—

Variables of economical fastener design selection and assembly are discussed in the Engineering Data section of our catalogue that we will send upon request.

*Manufacturer of Standard and Special
*12 Pointer, Square and Hexagon Nuts
... "Huglock" and "Conelock" locknuts.*

**NATIONAL MACHINE
PRODUCTS COMPANY**

an **SPS** company 44250 UTICA ROAD
UTICA, MICH

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eastern area. Paul E. Wolfe & Assoc., Orange, Conn., will represent Truarc in New England and J. O. King, Inc., in the deep South.

MESLER JOINS STANSCREW BOLT SLS. DEPT.

Standard Screw Company has appointed Clifford A. Mesler as supervisor of bolt sales. This follows the company's recent addition of hex machine and carriage bolts to its Stanscrew line and coincides with a planned program of further expansion into the bolt market.



MESLER

Mesler joins Stanscrew after 32 years' service with Buffalo Bolt Company, most recently, as western division sales manager. Reporting to H. T. Thompson, Stanscrew sales manager for the Chicago division, Mesler will make his headquarters at this division in Bellwood, Ill.

Standard Screw also announced the transfer of Paul L. Peyton Jr. to its division from the Hartford Machine Screw Co. Peyton will represent Stanscrew in the northern N. J. and New York City area.

ALBANY PRODUCTS ACQUIRES B&M ASSETS

Albany Products Co., Inc. of South Norwalk, Conn. announced the acquisition of the entire assets and inventory of B & M Stainless Fasteners Inc. of Malden, Mass. The latter will continue operation as a wholly-owned subsidiary.

BANNER NAMES NEW REPRESENTATIVES

The Banner Screw Co., Inc., Chicago, Ill., announced the appointments of new representatives in the midwest: Eberly Sales Co., Fort Wayne, Ind., for the state of Indiana and the Campbell Metal Parts Co., Pontiac, Mich., for the state of Michigan and the Toledo, Ohio area.

BRISTOL ADDS SOCKET SCREW SALESMEN

Three new socket screw product representatives have been appointed by the Bristol Co., Waterbury, Conn.

Walter Koklauner will join the Cleveland office with 13 years of industrial sales experience in the area. Added to the St. Louis office are Richard Margedant, coming from the Midwest Tool & Supply Co., and Walter Cunningham, formerly with the American Screw Company. Both men will cover the same seven-state area.

Nicholas W. Edes, Jr. has been appointed to the company's Cleveland district. Edes' previous experience includes 14 years with Greenfield Tap and Die Company.

RAMSET NAMES BENEDICT SALES MANAGER

R. H. Benedict, Jr., has been named sales manager for Ramset Fastening System, Cleveland, a part of Olin Mathieson Chemical Corp. Benedict, who joined the company in 1955 to take charge of its Ramset training school, was most recently assistant field sales manager.

POP RIVET DIV. NAMES DISTRIBUTOR EXEC.

Jack H. Schofield has been made responsible for distributor relations in the Pop Rivet Division of the United Shoe Machinery Corp., Boston. Schofield will be headquartered in Shelton, Conn. This appointment reflects the division's expansion in distributorships.

AP&S ADDS BRAZING REP. IN NEW ENGLAND

The American Platinum & Silver Division of Engelhard Industries, Inc., has named Eugene G. Evans division sales representative in the brazing and industrial field in New England. He will make his headquarters in Providence, R.I.

SUPERWELD ELECTS NEW BOARD MEMBER

Election of Henry C. Diehl as a member of the board of directors of Superweld Corp., North Hollywood, Calif., high-temperature brazing firm, is announced by R. E. Jones, Pres.



- This is really an up-to-date handbook covering the Design and Purchasing of cold headed fasteners and small parts. Loaded with money saving 'Knew-How'! Send for your copy of Catalog No. 106.

JOHN HASSALL, INC.

BOX 2217 WESTBURY, LONG ISLAND, N. Y.

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look into eyelets
your FASTENING

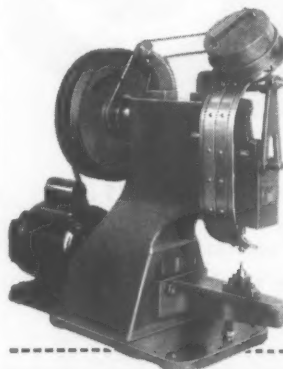


to solve
PROBLEM



**AUTOMATIC
EYELETING
MACHINERY**

single & multiple settings for product
improvement and continuing savings



Manufacturers who introduce precision built Edward Segal eyeleting machines to their fastening jobs find they require less handling and production time over other methods—and the machines are complete with no adaptation necessary. Eyelets usually cost much less, and the fastening looks far better.

Depending upon your operation, these highly reliable machines can be supplied with varying degrees of automation. Feeding is simplified, and because of the Limited Travel Spindle (pat. pend.), even settings as small as .032" I.D. are possible with a minimum of tool breakage.

Let Segal engineers study your fastening problem without obligation. Write for details to section AFE-9

EDWARD SEGAL • 132 LAFAYETTE STREET, NEW YORK 13, N. Y.
Manufacturers of eyeleting machinery, special hoppers and feeding devices

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Assembly and Fastener Engineering

ACCURATE THREADED MOVES TO NEW PLANT



Accurate Threaded Fasteners, Inc., has announced that it is moving its manufacturing division to a recently constructed building at 7320 Agatite Ave., in Norridge, Illinois. The new plant is a one-story structure of 30,000 sq. ft. The firm is installing new equipment: machines designed for the cleaning and deburring of cold headed parts, thread rollers and screw slotters.

GRIP NUT APPOINTS MIDWEST SALES REP.



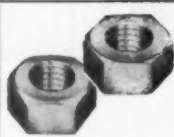



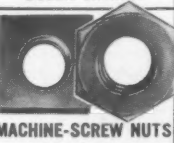
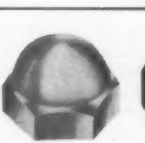
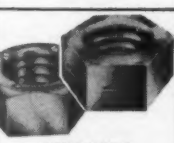
The Grip Nut Co., South Whitley, Ind., appointed James McGraw as a direct sales representative to cover Kansas, Missouri, Western Tennessee and lower Illinois. Mr. McGraw's headquarters will be in St. Louis.

SALES CHANGES AT REPUBLIC BOLT & NUT

Major changes in the sales direction of the Bolt and Nut Division of Republic Steel Corporation are now in effect, announces Norman W. Foy, vice president in charge of sales.

Harvey Craig, general manager of sales for the past four years, has been named to the newly created post of manager of trade relations for the company. He was succeeded as Bolt and Nut general sales manager by Jack D. Cavan, assistant general manager of sales. William C. Schnackel, who has been an assistant sales manager since 1956 has been appointed an assistant sales manager of the company's Bar Division. He will supplement the work of the present assistant sales managers, R. R. Newell and E. K. Waldschmidt.

continued

 <p>CONDUIT LOCKNUTS — Up to 6"</p>	 <p>SPRING-NUTS Preassembled Nut & Spring Lock Washer</p>	 <p>FINISHED NUTS Heavy • Regular Jam</p>
 <p>VOLUME-CONTROL & SWITCH MOUNTING NUTS Single & Double Chamfer</p>	 <p>STOP-NUTS WITH FIBER INSERT</p>	 <p>WING NUTS</p>
 <p>MACHINE-SCREW NUTS Standard & Small Pattern—Single & Double Chamfer</p>	 <p>CAP NUTS</p>	 <p>STOP-NUTS Standard & Reversible One-Piece—Re-usable</p>

Available in Stainless Steel, Silicon Bronze, Brass, Aluminum and Steel

JACOBSON NUT MFG. CORP. Kenilworth, New Jersey

Use postpaid card. Circle No. 264

September, 1959



SCREWS ARE GOOD SCREWS
... Ask a man who has used them!



THREAD-CUTTING SCREWS

Many modern assemblies, particularly in plastics and soft metals, make use of these vital fasteners. ELCO is equipped to produce all standard types and sizes (or specials if desired) in any quantities, at economical prices, and usually for prompt delivery. Send prints for quotation. Write for free package of samples.

WOOD SCREWS
MACHINE SCREWS
MACHINE SCREW NUTS
TAPPING SCREWS
PHILLIPS AND SEMS SCREWS
PIPE PLUGS

STOVE BOLTS
CAP SCREWS
LAG SCREWS
DRIVE SCREWS
SPECIAL SCREWS
COLD HEADED PRODUCTS

We Also Specialize in Making Any of Our Products of the Following Materials

Stainless Steel	Copper	Monel
Bronze	Silicon Bronze	Aluminum
Brass	Ambrac	Special Analysis

It's Always a good time to order from
ELCO

ELCO TOOL & SCREW CORPORATION
1101 SAMUELSON ROAD
ROCKFORD
ILLINOIS



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In his new post, Craig will assist all Republic sales divisions and districts in coordinating sales efforts with customers and other key steel consumers.

LOGAN ELECTED PRES. OF TOWNE ROBINSON

Andrew B. Logan was elected president of Towne Robinson Nut Co., Dearborn, Mich., announced the board of directors.

An engineer for 27 years with the General Electric Corp., Logan joined Towne Robinson in 1952 as sales manager. He was named general manager in 1955. Logan supervised construction of the company's new building in Dearborn, Mich., and has been in the fastener field for 35 years.



Four veteran members of the company were also promoted to vice president: John R. Hibler in charge of sales; John T. Jordan, purchasing; Paul DeLoe, cold heading division; Henry P. Selman, steel mill and tapping division.

WALL COLMONOY NAMES BRAZING MGR.

Appointment of G. A. Barris as general manager of the Stainless Processing Div. has been announced by Mr. R. L. Peaslee, vice president of Wall Colmonoy Corp., Detroit.

Barris joined engineering at Lawrence Institute of Technology, joined Wall Colmonoy seven years ago. His industrial background includes experience in metals processing at Saginaw Malleable Iron Foundry. Prior to his new appointment, he had been plant manager for the Division.

ADHESIVE MANUFACTURER EXPANDS PLANT

Houghton Laboratories, Inc., of Olean, N. Y., has completed another building in its expansion program: a new raw materials warehouse containing 4300 sq. ft. complete with new truck loading docks and railroad siding.

WELDING SHOW ANALYSIS AVAILABLE

The American Welding Society announces the availability of the Attendance Analysis of the 1959 Welding Show, held in Chicago, Ill., giving a regional breakdown and an occupational breakdown of the registered attendance drawn from the areas surrounding Chicago and the percentage from more remote areas.

The occupational breakdown lists percentages from executive management, engineers, general welding, production, purchasing, instructors and technicians, and government.

Practically 90% of those attending the Chicago Show had the authority to recommend, specify, or place orders. This unusually high percentage accounts for the fact that 70% of exhibitors have exhibited at the AWS Welding Show for the last three years, and 58% have never missed a show.

The 41st Annual AWS Meeting and Welding Show will be held in Los Angeles, April 25-29, 1960.

Copies of the Attendance Analysis may be obtained without charge from The American Welding Society, 33 West 39th Street, New York 18, New York.

EATON NAMES NEW DETROIT SALES MANAGER

Retirement of the Detroit district sales manager and appointment of a new manager has been announced by the Reliance Division of Eaton Mfg. Co., Massillon, Ohio.

After 31 years with the firm, L. E. Brown is retiring to be succeeded by William R. Chandler, who brings to his new position 17 years of experience with Eaton. He was formerly assistant manager of the Detroit office, a sales engineer in Cleveland and has served in the metallurgical inspection department at the home office.



BROWN



CHANDLER

SPECIAL RIVETS
like some of the samples shown here . . . or the more commonly used tubular and split rivets . . . they're all alike to the American Rivet Co. And always—our own special brand of quality and service that gets you what you want when you want it.

THE AMERICAN RIVET CO., Inc.
847 N. Kedzie Ave., Chicago 51, Ill.

Write for price list. For specials, send specifications for prices.

BUY AMERICAN Tubular and Split RIVETS

Use postpaid card. Circle No. 266

STANDARD and SPECIAL
FASTENERS for EVERY FASTENING OPERATION
from the
ORIGINATORS
of:

FLOATING CLINCH NUT 887 **FLOATING CLINCH NUT 780** **WELD NUT 1650**

Here are a few of the fasteners which have been patented and manufactured exclusively for the past 20 years by Mount Clemens Metal Products Company. A complete stock of standard fasteners is always on hand for immediate delivery and prompt attention is given to special orders. The manufacturing, engineering and experimental departments of Mount Clemens Metal Products Company are ready to assist you with any of your fastener or special parts problems.

Write today for complete information on your specific nut & fastener problems.

MOUNT CLEMENS
METAL PRODUCTS COMPANY
2480 W. Maple, Birmingham, Mich.

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Assembly and Fastener Engineering

WALES-STRIPPIT MOVES WEST COAST PLANT



A move of its west coast division office and plant in June saw Wales-Strippit, Inc., relocate at 6440 E. Corvette St., Los Angeles 22, Calif. Production and warehousing facilities have been tripled.

STERLING BOLT SHIPPING BOX WINS AWARD

A corrugated shipping container for nuts, screws and bolts made by Mead Containers, Inc., Industrial Container Division, Chicago, for Sterling Bolt Company, Chicago, was awarded the gold ribbon for high density products at the Fifth Fibre Box Competition in Washington, D.C.

This one-piece corrugated box made of 275 lb. test combined containerboard is an innovation in the key-type corrugated container.

FOUR A.S.M.E. MEETINGS IN SEPTEMBER

The American Society of Mechanical Engineers will sponsor four conferences during the month of September. On Sept. 10-11 the Wood Industries conference will be held in Portland, Ore.; Sept. 17-18, Engineering Management, Los Angeles; Sept. 20-23, Petroleum Mechanical Engineering, Houston, Tex.; Sept. 28-Oct. 1, National Power, Kansas City, Mo.

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your
**MISSILE
FASTENING
PROBLEM?**

Delron's NEW
ENGINEERING DATA MAY HAVE THE ANSWERS!

Our 48-page Catalog of Specialized Fastening Devices for High Temperatures and Sandwich Panel Fastening can help you select the right Fastener for your Missile Applications.

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THE DELRON COMPANY, INC.
5224 Southern Avenue, South Gate, California
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September, 1959

**NATIONAL LOCK
FASTENERS**
to your "specs"

National Lock Company sales engineers will work with you in solving all your fastener problems. Our extensive engineering and production facilities are geared to handle your requirements for special-purpose or standard fasteners of uniform quality . . . delivered on time.

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"KEPS"®
REGISTERED
TRADEMARK
OF ILLINOIS
TOOL WORKS

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FASTENER DIVISION
ROCKFORD, ILLINOIS

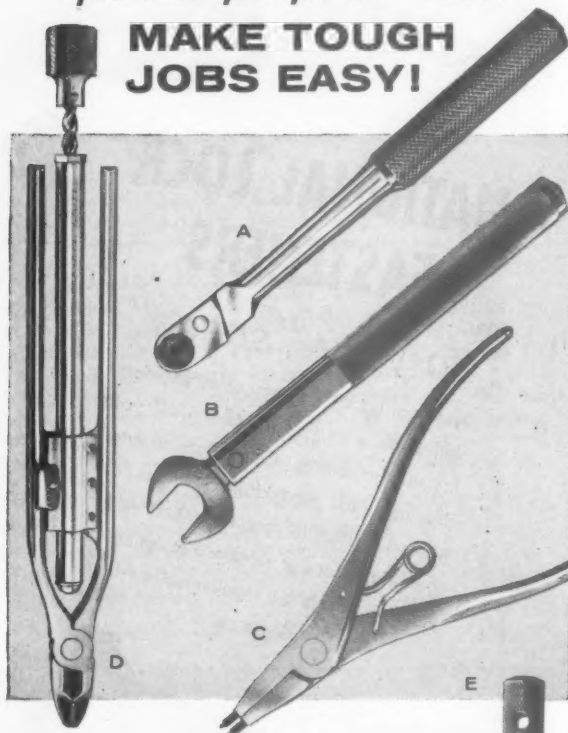
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93

MILBAR

special purpose tools

MAKE TOUGH JOBS EASY!



A. MILBAR CLOSE-CLEARANCE RATCHET WRENCH for tightening or removing twelve-point or hex-head screws and nuts. Fits in the tight spots where regular wrenches won't work. Smooth ratchet action. Several sizes available. Widely used in aircraft and missile industries.

B. MILBAR SNAP TORQUE TOOL—with pre-set torque. A "click" you can feel and hear tells when proper torque is reached. A choice of head types for specific jobs. Widely used on production lines in the automotive and aircraft industries.

C. MILBAR SNAP RING TOOL—the original and most widely used tool with replaceable points of different shapes and sizes. Tool lasts forever—just change points for the job at hand or when they wear out. Special points for holeless snap rings.

D. MILBAR WIRE TWISTER—for smooth, automatic one-hand operation. Extra large serrated jaws assure a longer life and non-slip grip. Spring return and squeeze release eliminates need for shifting hands. Twists and cuts wires with no waste motion.

E. MILBAR GEARED RIGHT-ANGLE TOOL—for easy access to "tight" spots. Fits all standard $\frac{3}{4}$ " drive extensions, sockets and ratchets. Reaches around corners and delivers increased torque for tightening or removal. Eliminates unnecessary removal of parts to get at the job to be done. Fully proven and tested by thousands of users.

Send for your free brochure describing these, and other, MILBAR Special Purpose Hand Tools. MILBAR has the engineering facilities and personnel to solve your special problems where sufficient volume is involved.

MILBAR CORPORATION

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FEDERAL NAMES WELDING REPRESENTATIVE

The Harding Equipment Company, Paramus, N.J. has been appointed sales and service representatives for Federal Machine and Welder Company in New York City and Newark area.

HUNTER SPRING APPOINTS PLANT MANAGER

The appointment of Stanley L. Albright as manager, plant No. 2 is announced by Philip C. Clarke, general manager of the Hunter Spring Company, a division of American Machine & Metals, Inc., Lansdale, Pa. Albright joined Hunter in 1947 and most recently represented Hunter as a sales engineer in New York City and adjacent areas.

NEW VICKERS SALES MGR. IN DETROIT

The new district manager of Vickers' Detroit industrial sales office is Jacques Carpenter, formerly district manager at Worcester, Mass. This was announced by the Machinery Hydraulics division of Vickers Incorporated, a division of Sperry Rand Corporation.

Carpenter has been with Vickers since 1941 and has spent the last 15 years in various sales capacities.

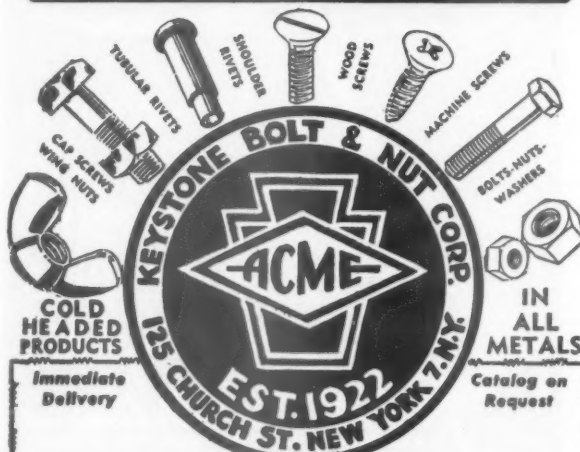
WILGUS JOINS OLYMPIC AS V-P SALES

Edward D. Wilgus has been appointed vice president and sales manager of Olympic Screw & Rivet Corp., Downey, Calif.

Wilgus assumes his new position after serving in an executive capacity with Aviation Developments, Inc., Burbank, Calif. He has been active in the specialty fastener industry for over 15 years, and previously was associated in the air frame industry.



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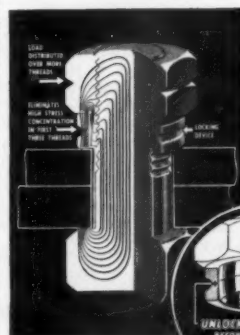
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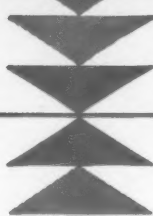
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ONE LAST WORD

POOR QUALITY: WHOSE FAULT?



Product reliability, or high product quality, are the responsibility of management! If the product is below par, or downright poor, management and management alone must bear the censure of the consumer. The designers, engineers and workers are but instruments of management, or at least an extension of management, and it is through them that management's views are translated into autos, refrigerators, television sets, generators, etc. If management is sincerely interested in good quality, rather than give it mere lip service, then the end result will show up in the tv set, washing machine, dryer, auto or tire. If, on the other hand, management believes that cost and price is the alpha and omega of business then the product will be merely one step above junk and not worthy of consideration by the consumer.

Management may well point to its quality control department as the final authority in this matter; however, this is open to question, especially by the quality control department. Can you imagine what would happen if q.c. found a defective system in one out of ten dryers. Do you think management would hold up an entire warehouse full of dryers until each one was tested, especially if dealers were clamoring for delivery? Of course not! Management would say, it's only one out of ten, the servicemen will straighten it out quickly enough. Too often q.c. is organized to merely prevent scrap, to correct faulty machine work, at the same time neglecting the over-all quality of

the finished product. The perfection of the units does not assure the perfection of the whole. No one knows this better than the aircraft and missiles people who have been concerned with quality control on a piece part basis as well as on an over-all systems basis for many years. The auto boys would do well to look into this matter.

The quality control department reflects management thinking in its work even though this is one department which should be autonomous, a high priest of excellence. Absence of quality thinking at the top is reflected in a devil-may-care attitude at the bottom. Unless quality permeates the organization from the top down, little importance can be achieved.

The quality of American products is deteriorating rapidly. From a \$4,000 auto down to a \$400 appliance: Once you've bought either of them the service man has a mortgage on your income and he's ready for his cut. Not once, but for evermore. If you want the item you've gone into hock for, be sure you've got a cache to handle the service bills.

The situation is disgraceful, all the more so because designers, engineers and workers can produce excellent products. But so long as cost and price, and they alone, dictate managerial thinking, so long will our products remain third-rate. However, many people are beginning to be aware of the quality of foreign goods. If management should also become aware of it there may be hope.

Wm. J. Schleicher

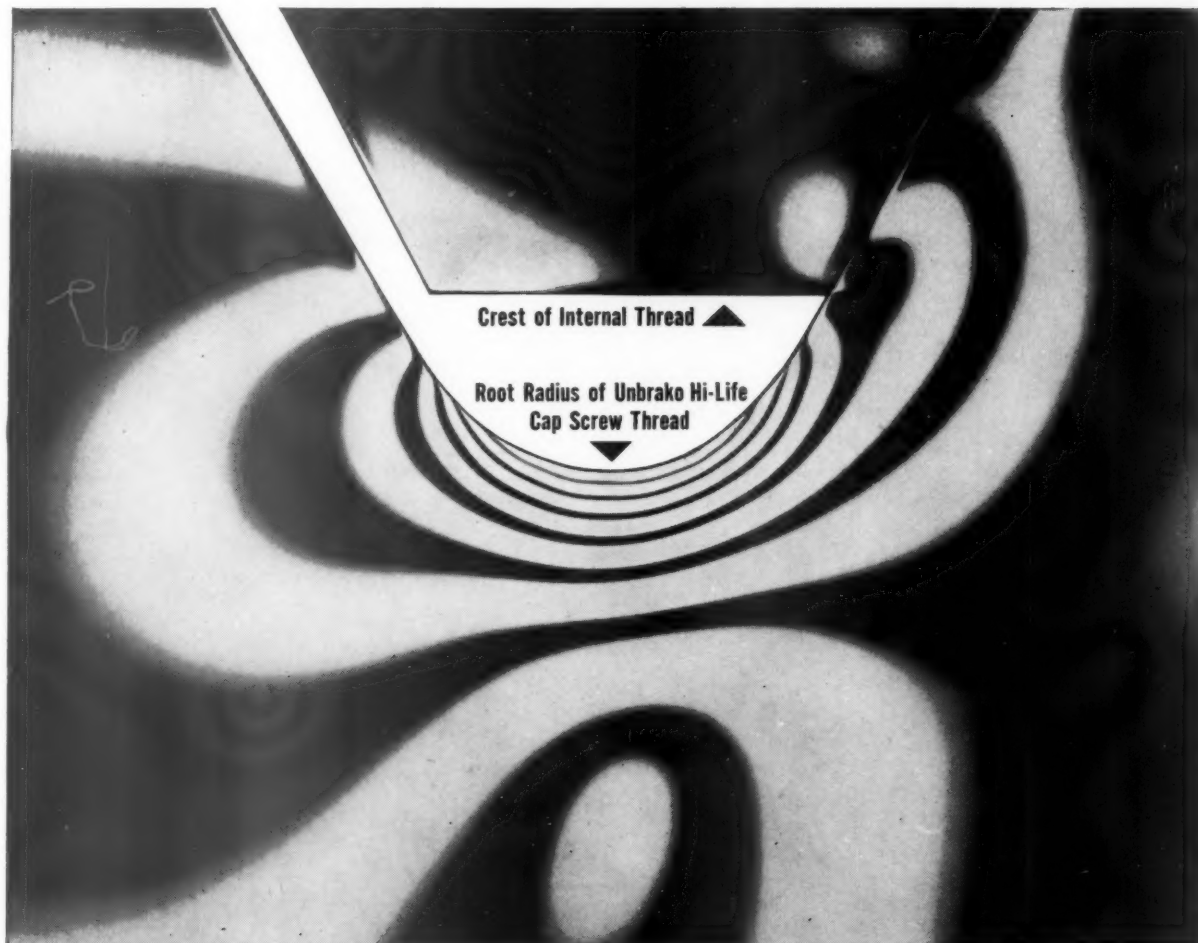
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